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THE IRON TRADE REVIEW

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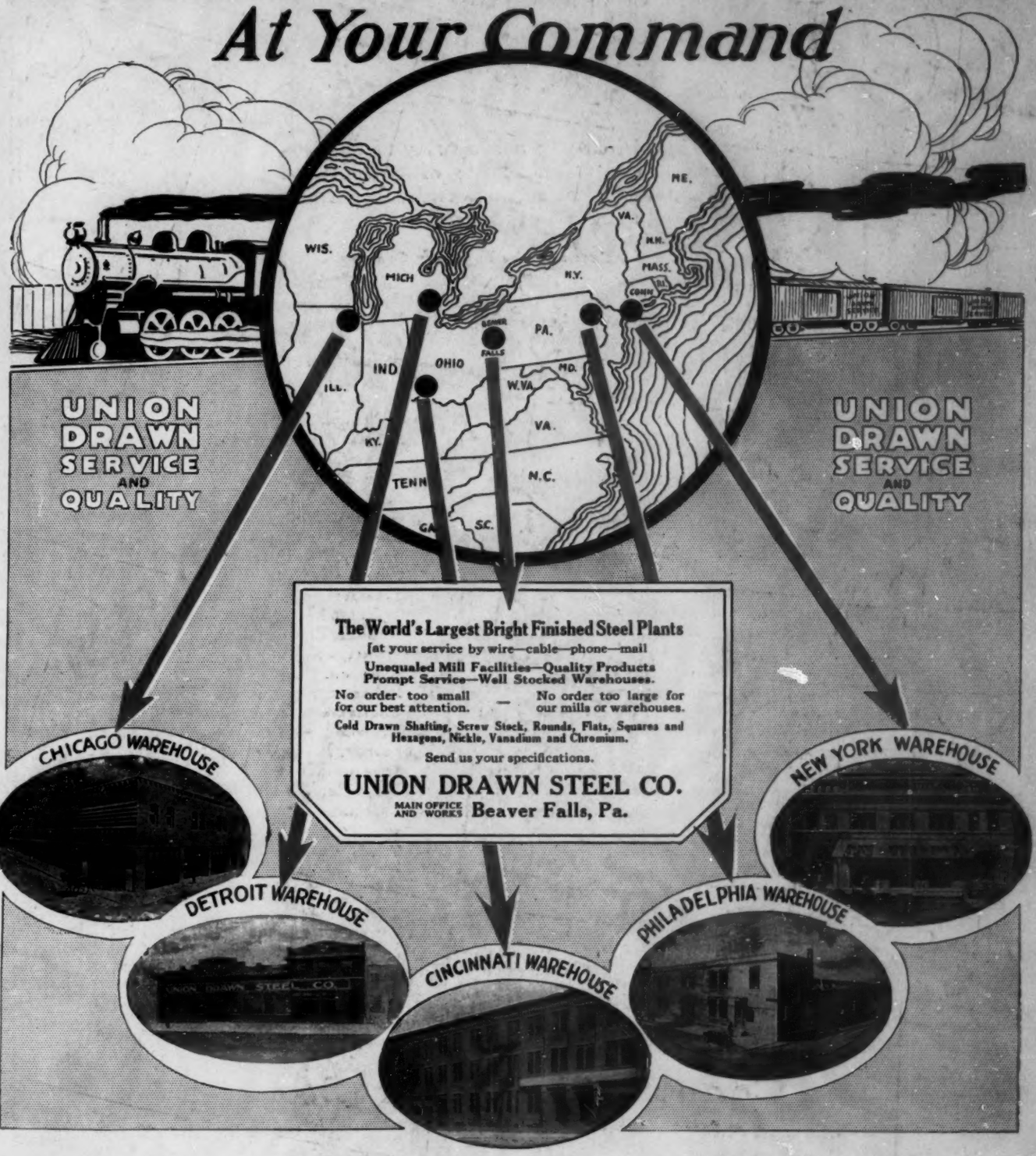

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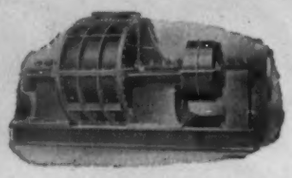

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THE IRON TRADE REVIEW

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More Cheerful Sentiment Prevails

As Result of Chicago Conventions, But New Business is Light—
Improved Inquiry for Pig Iron in the East

THE iron trade regards the results of the two conventions in Chicago as highly satisfactory. There is rejoicing on account of the elimination of the most dangerous element, and there is a general feeling that the intense bitterness which threatened to characterize the campaign will be lacking. The more cheerful sentiment prevailing has not, however, been reflected in actual business transactions up to the present time. While there is no real weakness, except in southern pig iron, the evidence of easier conditions is unmistakable. This is shown particularly in the tendency to make more reasonable quotations for prompt delivery of finished materials.

The iron ore movement from the Lake Superior region is very heavy. A labor disturbance at Virginia, Minn., which threatened to be serious, has been suppressed by vigorous measures and quiet now prevails. Shippers are offering $1 per ton for the movement of ore from upper lake ports.

Russia, according to well defined reports, has closed for another tremendous tonnage of rails in this country. One leading producer is reported to have taken 150,000 to 175,000 tons. It is now known that Russian railway authorities recently asked for 350,000 tons in a single inquiry. The Steel Corporation will share largely in this business. It is believed the new Russian loan of $50,000,000 is responsible for bringing these large purchases to a head.

Pig Iron

In the east and in the Buffalo district, there is more activity in inquiring for pig iron, and such prominent consumers as the General Electric Co. and the American Locomotive Co. have come into the market for round tonnages. In Chicago, there is also an improved outlook, and an inquiry for 15,000 tons of foundry grades is pending. In nearly all centers, however, the market is dull. In the south, some very low quotations are being made on warrant iron and sales have been made as low as $14, Birmingham, for No. 2 foundry The principal cause for the weakness of southern iron seems to be that many foundries which use this product bought with the expectation of operating at full capacity, but many of them, largely on account of inability to employ molders, have been running at 80 per cent and less. Hence there is a surplus of pig iron and stocks in Alabama furnace yards now aggregate 350,000 tons. Foreign demand for steel-making grades continues to be a factor in the north.

Bars

Agricultural implement manufacturers, some of whom bought steel bars for the remainder of this year at 1.90c, and others, who paid 2.25c, are resisting the 2.50c price, which has been named by the mills for the first half of next year. This position is being strongly taken by leading competitors of the principal harvester concern, which makes much of its own steel. Consumers of steel bars other than implement makers are anxious to contract, but are, as a rule, finding it impossible to do so for delivery after Jan. 1, 1917. Contracts made for the last half of this year at 2.50c, Pittsburgh, are entered with the understanding that deliveries are not to begin before Jan. 1, 1917.

Plates

Plates continue very strong. While the highest premium prices are disappearing, one leading eastern Pennsylvania company is still quoting 4c, Pittsburgh, and cannot give delivery in less than six months. The Pennsylvania Railroad Co. has again been a buyer of plates for this year's delivery at its Altoona plant, paying 3.75c,Pittsburgh. Inquiries for ship yards foot up large tonnages.

Shapes

A leading independent steel company is offering to make deliveries at early dates on shapes and bars at lower prices than have prevailed recently and prompt delivery of these products is now being made at 2.50c, Pittsburgh. Another company is booking third quarter contracts for shapes at 2.50c, Pittsburgh, on bar sizes and 2.60c, Pittsburgh, on common shape sections, shipment to be made at its convenience.

THE OPEN HEARTH

Employers Ready to Do Their Part

THE extremely interesting letters addressed to *The Iron Trade Review* in regard to the Memorial Day speech of President Wilson, concerning the duty of the business men of the country to support the government in organizing a volunteer army, make clear the position of manufacturers employing hundreds of thousands of men. They leave no doubt as to the patriotism of the manufacturers or of their intention not to allow their views conflicting with those of the President on some policies to have anything to do with their action concerning preparedness. Other points may be summarized as follows:

First—The writers of the letters take kindly to the military training camps. Some are more liberal than others in their ideas, but all recognize that employers and employes ought to co-operate so as not to demoralize business unnecessarily. While the value of military training in camp is appreciated, these camps must be conducted with a serious purpose and men going to them must not act as if they were going on a frolic. President Glass, of the Whitaker-Glessner Co., Wheeling, W. Va., states his position very clearly when he says: "We will make only one condition, and that is that applicants for leave for this purpose intend giving their services to the government in case of war." In the case of at least one large firm, that of Pickands, Mather & Co., it is noteworthy that the employes will be given permission to attend training camps, not only without loss of pay, but also without loss of their usual vacations.

Second—A number of the letters point out that in all probability many employes would be able to render the most valuable service by continuing at work in the event of war. It is pointed out that in several foreign countries men engaged in iron and steel plants have been exempted from military service. That kind of service has been considered just as honorable as fighting in the trenches. No one can question the soundness of this position.

Third—There is difference of opinion as to whether service should be compulsory or voluntary. For example, President Lemoine, of the United States Cast Iron Pipe & Foundry Co., an employer of many men, states that his company will co-operate in any way it can consistently in promoting *voluntary* military service. On the other hand, President Ker, of the Sharon Steel Hoop Co., says he does not believe that voluntary military service will ever solve the problem. He is of the opinion that the only way to build up an adequate military establishment is to compel the males to take military training. Chairman Topping, of the Republic Iron & Steel Co., says that preparedness, to be effective, should place obligations of a mutual character on both the employe and the employer. President Bowron, of the Gulf States Steel Co., favors service on the Swiss model, beginning with all children of school age. President Metcalf, of the Braeburn Steel Co., believes that if military service is made compulsory, so that every man of military age must serve a given number of days per year in the army, the law should compel all corporations and other employers to pay their men in full for the time spent in miliary service. He points out, however, that if enlistment should be voluntary, then one company could not afford to pay full wages to its soldier employes unless its competitors should have an equal proportion of enlisted men to whom they should pay wages during their time of enlistment. We do not believe that, even if the service should be compulsory, the employers should be compelled to pay their men in full for the time spent in military service. Such a law would be likely to bankrupt many employers. But we do believe that the government should do its full part and by just taxation collect enough money to pay the soldiers and their dependents.

As a whole, the symposium printed elsewhere in this issue, following expressions of opinion of manufacturers in the preceding two numbers of *The Iron Trade Review*, forms a valuable contribution to the discussion of highly important problems.

What Ails the Merchant Marine?

A SURPRISING amount of misinformation is continually afloat as to the cause of the decline in the merchant marine and of its failure to be built up as a result of some efforts that have been made by congress in recent years. Even some business men fall into error and O. C. Barber, the well-known match manufacturer of Akron, has been quoted as attributing the sad condition of the merchant marine to the tariff on ship building materials. He ought to know that there is not now and has not been for years any tariff whatever on materials for ship building purposes. The law, as amended in 1897, 1909 and 1912, provides that all materials of foreign production which may be necessary for the construction of vessels built in the United States for foreign account and ownership, or for the purpose of being employed in the foreign trade, including the trade between the Atlantic and Pacific ports of the United States, and all materials necessary for the building of their machinery and other equipment, may be imported under bond, and upon proof that such materials have been used for such purposes, no duty shall be paid thereon. Prior to 1912, vessels engaged

THE OPEN HEARTH

in the coastwise trade were not included, but the Panama canal act removed all restrictions as to coastwise vessels and those built for foreign account.

Not one ship has been built of imported material since the duty was removed. Before the original law was passed, congress was told that such would be the case by ship builders, ship owners and material makers, but the "statesmen" failed to heed the advice of men who knew what they were talking about.

Next, congress provided for American registry of foreign built ships, and even set aside the citizenship requirements for officers, because another group of advisers said that was all that was needed. What was the result? Only to provide registry for a number of ships already owned by American capital, but sailing under foreign flags to avoid the operation of our navigation law. Even this would not have happened had it not been for the breaking out of the European war and the immunity offered by a neutral flag. It is as certain as anything in the future can be that, when hostilities have ceased, nearly all of the ships will return to the use of foreign flags, unless navigation laws are changed.

To please another group who clamored for differential duties, the law has been twice amended, in 1909, and 1913, to provide for such differentials, but these attempts have proved ineffectual on account of treaty provisions.

In short, every political device, no matter how chimerical, has been tried to dodge tackling the revision of the navigation laws, because, as congressmen well know, the subject is loaded and they lack both the ability and the moral courage to approach it. The fact remains, however, that the laws must be revised or large subventions granted in order to insure the establishment of an American merchant marine worthy of the name.

The present national administration now proposes to have the United States engage in the shipping business, apparently on the assumption that by some hocus pocus the nation can carry on with a profit, in spite of our navigation laws and in competition with the whole world, a business which corporations and individuals with ample capital and experience have not been able to carry on. The deficits, of course, would come out of the treasury, which in some mysterious way, or by the juggling of figures, will be continually replenished without cost to the general public. The interest alone on the sum required to carry out this plan is greater than has been asked of congress in other years merely to assist in developing our foreign seas trade. We do not believe the American people will indorse this waste of money, following the appropriation of $20,000,000 for a government nitrate plant, $11,000,000 for an armor plate plant and other equally outrageous appropriations.

A Deserved Promotion

THE members of the federal trade commission are to be congratulated upon their decision to promote Hon. E. N. Hurley to the position of chairman. We have no inside information as to the cause for this decision. We prefer to believe that there was nothing personal in it. Mr. Davies has made an excellent chairman, but we believe that this is an honor that should be passed around, as it is in the case of the interstate commerce commission, and that Mr. Hurley especially is deserving to occupy the chair at the head of the table for a year.

As was pointed out in these columns in our issue of June 1, Mr. Hurley is big enough to admit that he has developed since he went to Washington. He is free to say that he has learned. It is a man who knows not and knows that he knows not who can be taught. For sometime past, Mr. Hurley has been taking a decidedly broad and progressive position in regard to the great business interests of the country. We congratulate him, and likewise all business men who believe in fair methods.

"Cutting the Booze"

IN COMMON parlance, the terse conclusion of the committee on inebriety of the recent national conference on charities and corrections, at Indianapolis, was, "The boss says, cut the booze."

The report abounded in practical points covering the results of extended studies as to the attitude of the railroads, public service corporations, retail stores, mail order houses, sales organizations, mining companies, dealers in steel and wooden products, advertising and employers' benefit associations. The secretary of the committee, Alexander Fleisher, stated that returns had been received from the employers of 750,000 people. These employers forbid alcohol in their plants. In many instances, its use is considered in the promotion and retention of employes. Mr. Fleisher might have added that in some of the important steel plants men who indulge in the use of intoxicating liquors are not thought of at all for promotion. The attitude of the manufacturers toward the liquor question is indeed one of the most significant features of modern progress. It brings before every man in an intensely practical way the necessity of total abstinence. Its permanent effect is even more important than was the eloquence of a Francis Murphy or a John B. Gough in their palmiest days.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products June 14, average for May, 1916, average for March, 1916, and average for June, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices June 14, 1916.	Aver. for May, 1916.	Average for Mch., 1916.	Aver. for June, 1915.
Bessemer pig iron, Pittsburgh	$21.95	$21.95	$21.55	$14.58
Basic pig iron, Pittsburgh	18.95	18.95	19.20	13.54
No. 2 Fdy. pig iron, Pittsburgh	19.45	19.325	19.45	13.45
Northern No. 2 Fdy., Chgo.	19.00	19.00	18.70	13.00
Lake Superior Charcoal, Chgo.	19.75	19.75	19.75	15.25
Mall. Bess., Chgo.	19.50	19.50	19.20	13.00
Southern No. 2, Birmingham	14.50	14.95	15.25	9.57
Southern Ohio No. 2, Ironton	18.00	18.46	18.00	12.50
Basic, eastern Pa.	19.25	20.00	20.00	13.50
No. 2X Virginia furnace	18.50	18.00	18.25	12.50
No. 2X foundry, Philadelphia	20.25	20.50	20.25	14.25
Ferro mang., Balti., (1917)	175.00	175.00	150.00	105.00
Bessemer billets, Pbgh.	42.00	44.25	40.60	19.87
Bess. sheet bars, Pbgh.	42.00	44.25	41.00	20.37
Op.-h'th sh. bars, Pbgh.	42.00	44.25	41.00	20.37
Open-hearth billets, Pbgh.	42.00	44.25	40.60	19.87
Steel bars, Chgo.	3.10	3.00	2.50	1.39
Steel bars, Pittsburgh, contr.	2.50	2.50	2.34	1.20
Iron bars, Philadelphia	2.559	2.559	2.559	1.20
Iron bars, Cleveland, local del'y.	2.40	2.40	2.40	1.15
Iron bars, Chgo. mill	$2.35	2.35	2.19	1.15
Beams, Chgo.	3.10	3.00	2.50	1.39
Beams, Pittsburgh, contr.	2.50	2.50	2.40	1.20
Beams, Philadelphia	2.659	2.659	2.409	1.30
Tank plates, Pbgh., contract	2.90	2.75	2.50	1.15
Tank plates, Chicago	3.50	3.30	2.67	1.31
Tank plates, Philadelphia	3.909	3.909	3.409	1.30
Sheets, blk., No. 28, Pbgh.	3.00	2.925	2.75	1.80
Sheets, blue an., No. 10, Pbgh.	3.00	3.025	2.87	1.35
Sheets, galv., No. 28, Pbgh.	4.75	4.88	4.82	4.46
Wire nails, Pittsburgh	2.50	2.50	2.38	1.55
Connellsville fur. coke, contr.	2.75	2.60	2.80	1.65
Connellsville fdy. coke, contr.	3.50	3.50	3.90	2.25
Heavy melting steel, Pbgh.	16.00	17.12	17.95	11.75
Heavy melting steel, east'n Pa.	16.00	16.75	17.00	11.50
Heavy melting steel, Chgo.	15.00	16.50	16.20	9.37
No. 1 wrought eastern Pa.	20.75	22.50	22.50	12.75
No. 1 wrought, Chgo.	15.25	16.37	16.15	8.75
Rerolling rails, Chgo.	16.00	17.25	17.20	10.00
Car wheels, Chgo.	12.50	13.10	14.05	9.87

(For Additional Prices See Page 1350.)

More Inquiry for Pig Iron in East

Where Several Important Buyers Have Appeared in Market, But Dullness Prevails in Nearly All Sections

New York, June 13. — Several important consumers of iron have come out in this district for their last half requirements, totaling 25,000 to 30,000 tons, giving the domestic market the appearance of more life than it has possessed in some time. Apart from these matters, however, there are few inquiries coming out and signs of a general buying movement are lacking. The General Electric Co. asks 8,000 to 10,000 tons, including 4,000 of foundry iron for Erie, 2,500 to 3,000 tons of the same grade for Schenectady and 1,500 tons for Lynn, the latter including 1,000 tons of low phosphorus. The American Locomotive Co. is out for 5,000 tons of No. 2 plain and 750 tons of low silicon for Schenectady. A Depew, N. Y., steel maker is figuring on 5,000 to 10,000 tons of basic. A brake shoe manufacturer mentioned last week remains out for 4,000 to 5,000 tons of mixed grades for various plants. Export inquiry continues very heavy, totaling at least 100,000 tons. It is only the exception, however, where these inquiries are being turned into orders. The freight market remains easier, but still is spotty and rates to Italian ports have not come down. A lot of 10,000 tons of malleable for Italy has been closed and is understood to have gone to Buffalo. There has been another 3,000-ton sale of bessemer to Italy and Japan has taken 2,000 tons of standard low phosphorus from an eastern maker. Switzerland has closed for some foundry iron and still is figuring. Among the new foreign inquiries is one for 30,000 tons of steel-making iron on which details are lacking; another for 20,000 to 30,000 tons of steel-making grade put out by an English house; 1,500 tons of foundry for a copper company for South American delivery; three or four 10,000-ton lots of special bessemer and hematite for France and Italy. Brazil is out for some steel-making iron. Prices continue to show an inclination toward softness. The tidewater No. 2X range is from $20 to $20.50. Some New Jersey buyers are working for $20, delivered, on 3½ silicon metal.

Eastern Makers Sell For Export

Philadelphia, June 12. — Foreign business is figuring more prominently in the eastern and central Pennsylvania iron market. Several good-sized lots of bessemer iron for export have been closed by eastern Pennsylvania makers of merchant iron who now are planning to put some of their capacity to the making of this grade, as recently noted. There also have been export sales of foundry iron. A Nova Scotia steel maker has inquired here for 5,000 tons of basic which, if it is closed, probably will go to Buffalo makers. Various other inquiries are pending. The domestic market remains quiet, but less so than a week ago. Prices continue easier in all grades, but this takes the form of shading rather than any strong reduction in furnace schedules. A central Pennsylvania buyer has closed definitely with a Lebanon district maker for 15,000 tons of low phosphorus for last half. This is the same order previously mentioned in this report as having been closed. Lebanon low phosphorus is quoted $1 lower or $29 to $31, furnace. Standard low phosphorus is unchanged in price, but buyers are better able to satisfy new inquiries, as the pressure for deliveries is not so strong. Basic is irregular. A Phoenixville buyer closed for 1,000 tons for spot at a reported price of $19 to $19.25, delivered. Several thousand tons continue to be offered by a steel maker upon which it is understood $19, furnace, perhaps less, could be done. The Maryland Steel Co. has made no further purchases of basic. Its recent buying, it now is definitely established, consisted of one lot of 10,000 tons at $20, delivered, from a Lehigh valley maker and another of 12,000 tons at $19.25, delivered, from a Schuylkill valley furnace. Small sales of foundry iron for prompt have been

(*For complete prices see page* 1350.)

made at $19.25, eastern Pennsylvania furnace for No. 2X, or less than $20, delivered. It is indicated that $20, Philadelphia, for No. 2X can be done with some makers, although sales in the week still brought as high as $20.50, furnace, or $21.29, Philadelphia basis. One inquiry for 1,000 tons of foundry is current. An eastern Pennsylvania iron mill bought 1,000 tons of mill forge at about $19.25 delivered.

Heavy Inquiry Appears

Buffalo, June 13.—Furnaces of the Buffalo district report that an inquiry for 20,000 to 25,000 tons of pig iron of various grades, for current, last half and first half of 1917 has come into the market, including about 8,000 tons of foundry grades; 2,000 tons of malleable and over 10,000 tons of basic. The principal users in the market are the General Electric Co. and the American Locomotive Co.

The negotiations are still pending for the bulk of this business, as the actual sales of the week were very light. It is generally believed by the producers of the district that within a few weeks there will appear a more general inquiry from other buyers, seeking to cover for their needs as far ahead as the furnaces will permit. The melters are reported as being very busy, pressing the furnaces hard for iron under contract and limited only in their operations to the handicaps caused by labor shortages.

Large tonnages are going forward from the Buffalo stacks via the Erie canal for melters on the Hudson river, coast and Long Island Sound points.

Some producers are quoting slightly stiffer prices and the range from the minimum on low grades at $18.50 extends to $20.00 as the maximum on No. 1 foundry, with No. 2X foundry holding at $18.50 to $19.50, where current needs tonnages, last half and first half of 1917 deliveries are obtainable.

Pittsburgh Market Dull

Pittsburgh, June 13.—The domestic market for pig iron is decidedly quiet in western Pennsylvania and eastern Ohio. No inquiries of importance are reported and no sales have been made in the open market. Were it not for a large number of inquiries for shipment abroad, the pig iron market would be at a standstill. Inasmuch as most consumers have covered requirements for the second and third quarters, it is not surprising that demand is light.

England, France and Italy are negotiating for large tonnages of bessemer iron, but it is difficult to estimate how much iron actually is wanted, on account of the duplication of inquiries. It conservatively is estimated, however, that fully 25,000 tons of bessemer iron are involved in pending negotiations. One blast furnace interest is shipping 6,000 tons of bessemer iron to the eastern seaboard for export to Italy.

No change in the position of prices is noted. Bessemer iron is hovering around $21, valley, and basic is being held at $18, valley, and above. Both foundry and malleable grades are quiet, but the prevailing $18.50, valley, price seems to represent the minimum figure at which these grades are available.

More Bessemer for Italy

Cleveland, June 13.—Following the sale of 12,000 tons of bessemer pig iron made by M. A. Hanna & Co. about two weeks ago, for export to Italy, another Cleveland firm has made a sale of 13,000 tons of bessemer for export to the same country. The American Steel Foundries, which was in the market for 10,000 to 12,000 tons of basic, has withdrawn and the pig iron market in general is extremely quiet. No weakness has developed, however, in northern iron and it is believed that the period of inactivity will not last long.

Southern iron is weak. Some resale iron has been sold as low as $14, Birmingham, for No. 2, but it is not known that any furnace iron has been sold at that figure. One southern company is known to have 25,000 to 30,000 tons of pig iron for sale for prompt delivery at $14.50.

An inquiry from the General Electric Co. is for 4,500 tons of foundry iron, including 1,000 tons of No. 1 foundry, 1,000 tons of No. 2, 2,000 tons of No. 3 and 500 tons of malleable for August-December delivery at the Erie plant of the company.

Chicago Expects Activity

Chicago, June 13.—Signs are appearing that buying of northern and southern pig iron is about to be done in this market. The likelihood of considerable buying before long is evidenced by some inquiry for round tonnages which are appearing after several weeks during which nothing but small lots were asked for.

Several sellers have received an inquiry for 15,000 tons of foundry iron and it is believed this may result in buying a tonnage considerably larger. A manufacturer of railroad supplies has inquired for 3,500 to 4,000 tons of foundry iron for last half. The remainder of the present inquiry is mostly small lots to fill in, for prompt delivery.

Considerable inquiry for pig iron for export to Italy is being entertained, about 20,000 tons each of bessemer and foundry iron being desired. The former probably will move from the valleys and the foundry iron will be placed in the market giving the best quotation and freight rate.

Northern foundry and malleable iron have not weakened in price, $19, furnace, for foundry and $19.50, furnace, for malleable, being asked. No reason has appeared for shading these prices.

Small demand is current for southern iron and it continues weaker than was the case early in the year. At least one producer will take $14.50, Birmingham, for prompt delivery, while others ask $15. For last half of this year and first half of 1917, some makers are willing to contract at $15, Birmingham, while others make $15.50, Birmingham, their minimum.

Special irons are unchanged in price and situation.

St. Louis Market Quiet

St. Louis, June 13.—Very little is being done in pig iron in the St. Louis district, owing somewhat to labor disturbances, although a price of $15, Birmingham, is freely offered, and resale iron is refusing to change hands even as low as $13.50, Birmingham. Sales last week were few in number and were limited to 100-ton lots. Northern iron is held at $19, Chicago, and $19.50 for malleable.

Some $14 Resale Iron

Birmingham, Ala., June 12.—The top notch on forward iron in the Birmingham district is around $15 for this year and $15 to $15.50 for 1917. Spot and forward for this year are on the same level. Makers make little effort to name different prices. A car lot of July metal sold for $15. Philadelphia parties secured 500 tons for June and July at $15. Other small tonnages for spot and forward brought the same figure. No large transactions are reported. Business might be done in such cases around $14.75. Some resale pig iron has been offered at as low as $14, but there is, in the first place, not much of it, and, in the second place, it is for cash only. Hence it does not cut the figure it might otherwise do. Its sentimental effect, however, is felt. The leading interest holds 1917 delivery at $15.50, but the quotation is nominal. The Anniston interest, which offered pig at $15 for forward delivery May 1, or a little before in order to get into the market upon the resumption of operations July 1, is reported to have disposed of a very small tonnage. One interest reports an inquiry from the west for 11,000 tons and another for 4,000—two of the largest in some time. Prices were quoted, but no deals were

(*For complete prices see page* 1350.)

closed. Bargaining for lower prices is beginning to become a habit. The May Alabama production was another record breaker. However, the Woodwards have blown out a 400-ton stack and another will go on basic July 1. The problem is what to do with the proposed increase in output, if it eventuates as scheduled. The market at present is wobbly. No precipitous descent is expected, but it is difficult to maintain the $15 level. Some shippers have sent in stop orders, while others are anticipating. More iron would be moved but for intermittent car shortage.

Weak at Cincinnati

Cincinnati, June 13.—Prices on resale iron from both the south and southern Ohio are soft, and concessions are constantly being made by holders of that grade to buyers who will take prompt deliveries. Southern No. 2 foundry warrant iron is selling at $14.50, Birmingham basis, for prompt and last half shipment. Furnace iron can also be had at that figure, and a lap-over order for the first quarter of 1916 has been taken on that basis. The usual furnace price is $15, Birmingham basis, for the last half of 1916, and the first half of 1917. A small tonnage of southern Ohio resale iron is obtainable at $18, Ironton basis, for No. 2 foundry for prompt delivery. Furnaces in that district are holding at $19 for shipment over 1916 and the first half of 1917. Silvery iron is fluctuating over a wide range. Southern makers are quoting as low as $25, furnace, for 8 per cent silicon, but Jackson county makers are asking $29, furnace, for the same grade for the last half of 1916. The only inquiry before the market is from the General Electric Co., for 4,000 tons of foundry iron and 500 tons of malleable iron, for shipment over the last half and the first of 1917, to its western Pennsylvania plant. Sales include 1,000 tons of charcoal iron to a Michigan user for 1916 delivery.

Warrants Weak

New York, June 13. — Continuing weakness is shown in the market for southern pig iron warrants which now are quoted at from $13 to $13.50, for No. 2 at storage yards in the Birmingham district. Demand for either spot or future warrants is light. The weakness of the market is more pronounced in spot warrants, but futures also have been affected in proportion.

Bar Premiums Reduced

More Attractive Prices Being Made by Some Mills—
Agricultural Implement Makers Hesitate

Philadelphia, June 12.—One large maker of steel bars in Pennsylvania has been making more attractive offers both as to prices and deliveries, which it is reported apply chiefly to bessemer steel. Large rounds for delivery within a few weeks have been sold in fair-sized lots at 3.00c, Pittsburgh. For the common sizes of bars, reduced premiums over the 2.50c, Pittsburgh base price, have been asked for early delivery. There has been no deviation from the figure of 2.50c, Pittsburgh, which remains the minimum of the market and applies to varied deliveries according to the mill position of the sellers. There continues in the market a good many prospective buyers for contract tonnages this year, but there are few sellers on this basis. The munition steel market is quieter. Large bona fide inquiries both for steel and the finished shells are in the market, but few new contracts have been noted.

Pressure for Delivery

Buffalo, June 13.—Mills and agencies of the Buffalo district report that a greater degree of pressure is being brought to bear on them in the matter of deliveries, particularly on old specifications for material ordered in the latter part of 1915, than has been noted in some time. A number of the producers are still working at top pitch to get out tonnages specified for delivery back in November and December of last year.

Prices remain absolutely rigid.

Many Anxious to Contract

Cleveland, June 13. — Agricultural implement manufacturers do not take readily to the proposition of the mills to contract for the first half of 1917 at 2.50c, Pittsburgh, and it seems highly probable that when some of them contracted for their requirements up to Jan. 1, they bought more than will be needed for that period and soon will be asking to have contracts extended. Aside, however, from the agricultural implement people, manufacturers are for the most part eager to contract, but cannot do so for delivery after Jan. 1. One contract for nearly 4,000 tons for last half of this year was made this week, and many smaller contracts, but when contracts for the last half are made at 2.50c, Pittsburgh, by leading companies, it is understood that deliveries will not be started until after Jan. 1, 1917.

Re-rolled material is easier and western mills are selling at slightly below 2.50c, Cleveland, which is about 10 cents lower than the price being made by mills east of Cleveland for reinforcing bars and small shapes.

Bessemer Bars Easier

Pittsburgh, June 13.—Bessemer steel bars have been offered for delivery in four to six weeks by one manufacturer in western Pennsylvania at 2.50c, but no reports of open-hearth stock being sold for nearby shipment have been heard. Some mills rolling bars for the manufacture of war material have sold rejected stock for prompt shipment, but no trace of the prevailing 2.50c being shaded can be found. In fact, some manufacturers say that steel bars are the strongest item on the list. Specifications for shipment to domestic consumers are not so heavy as they were a few weeks ago and manufacturers of shrapnel are not buying so heavily as previously. Iron bars continue to be offered at a range from 2.65c to 2.75c. Demand for bar iron for export is described as heavy, but mills in this district are not attempting to sell material for shipment abroad.

Steel Bars Firm

Chicago, June 13. — Comparatively small business is being done in bar steel and the price remains firm at 2.50c, mill, for delivery at convenience. Offers by the leading interest and some independents to book requirements of agricultural implement dealers for first half of 1917 at 2.69c, Chicago mill, have been met by the statement from agricultural manufacturers that this price is too high and that bars costing so much cannot be used. As a result, practically nothing is being booked by this class of consumers.

It is understood that offers have been made by the leading interest to regular customers to book some tonnage of bars for first half of 1917 at the prevailing price. It is probable that tonnages will be limited under these offers, as a considerable portion of first half output already has been sold.

Hard steel bars are strong at 2.50c, Chicago mill, and some light sections have been sold as high as 3.00c, Chicago mill. Unusual demand for light sections for flat slab reinforcement has unbalanced the demand and it has been necessary in some instances for buyers to change their specifications

(*For complete prices see page* 1350.)

to heavier sections, in order to obtain convenient deliveries.

Bar Iron Quiet

Chicago, June 13.—New business in iron bars is slack and consumers do not appear to need further supply at this time. The price is firm at 2.50c for prompt delivery, which means 60 to 90 days, but 2.50c, Chicago mill, is being asked for last half delivery. This situation is somewhat unusual and the problem is whether the price will move up to the maximum or down to the minimum under the circumstances. Mills are well booked for two or three months and are willing to let the matter rest for the present.

Shafting

Pittsburgh, June 13. — Specifications for cold rolled steel shafting have not fallen off, but scarcely any new demand is reported. This is not surprising, in view of the fact that most consumers have covered requirements for the remainder of the year. Warehouses continue to sell shafting at as high as 50 per cent on the list.

Cotton Ties

Pittsburgh, June 13.—The market for cotton ties has not yet been opened and prices may not be announced until after July 1, since material will not actually be needed until next month. The Carnegie Steel Co. and the Pittsburgh Steel Co. will furnish all the ties rolled in this district. The Sharon Steel Hoop Co., Sharon, Pa., has not rolled cotton ties for several years. It generally is believed that this year's price will not be below $1 a bundle of 45 pounds.

Hoops and Bands

Pittsburgh, June 13.—Heavy demand still exists for hoops and bands, one manufacturer saying that he could wipe out all the tonnage now carried on mill order books and refill them again in less than a fortnight. While specifications have fallen off slightly, the general situation appears just as strong as ever. Mills now rolling tonnages purchased on the basis of 1.50c for bands, will be rolling material at from $5 to $15 a ton above that figure after July 1. Bands are being held at 2.50c and hoops at 2.75c for delivery at the convenience of the manufacturer. Some tonnage is being sold at $5 a ton above those prices for nearby delivery.

The Goldschmidt Thermit Co., Equitable building, New York, is exclusive agent of the Keokuk Electro Metals Co., Keokuk, Ia., whose plant is expected to be in operation during the present month. The annual capacity of the plant is from 2,500 to 3,000 tons of 50 per cent ferro-silicon per year.

Billet Inquiry

Comes From British Isles, But Prices Are Not High Enough

Philadelphia, June 12.—Inquiries for tonnage lots of billets, largely for the British Isles, are keeping up activity with eastern Pennsylvania mills. Many of these are quite desirable from a specification standpoint. Eastern makers, however, because their order books are so large, are able to give these matters only scant attention. Standing offers of $55, delivered at certain English points, have been made by the buyers, but these are much below the current market on this side, even at greatly reduced ocean freights. Sellers want more like $65 to $70, delivered, to interest them. A new sale of 1,000 tons of wire rods to England has been made at over $60 at southern seaboard. The domestic market on semi-finished material is quiet in this district. Crop ends are freely offered and it is reported these now may be had at from $28 to $30, mill. Leading eastern billet makers hold open-hearth re-rolling at $50, mill, and forging steel at $65, mill base.

Heavy Specifications

Pittsburgh, June 13.—Specifications for semi-finished steel products continue to come out in heavy volume and some new buying is reported at rather wide ranges in price. According to some consumers, billets and sheet bars are available at $40, mill, but leading sellers in western Pennsylvania say they would not pay $42 and some manufacturers are asking $45, mill. Unless demand increases considerably, it is not likely that the threatened shortage of semi-finished steel products will develop this year. Additional steel capacity has come in, relieving the situation at a time when some consumers were beginning to be pinched for requirements. Rather heavy tonnages of rejected ingots and billets are being offered in the open market, but such sales have not affected prices of material for re-rolling purposes.

Shell Steel for Next Year.

Youngstown, O., June 13.—One interest has sold several thousand tons of shell steel for delivery in the first half of 1917. The sale is significant as making the first actual sale by producing mills in this district of shell steel for delivery next year. A month ago when the big buying movement of shell steel was in full swing, it was expressly stipulated by the buyers that all material must be delivered before Jan. 1, 1917. During the past week, however, more inquiries have appeared from domestic munition makers covering their requirements for the first half of next year. It is obvious that these makers expect the war to continue more than six months and are forehandedly protecting themselves. The price obtained for the one sale noted closely approximates that received for last half steel. The domestic market is quiet. No sales of any size are noted. Sheet bars for last half quarter are being held at from $42 to $45, but no new contracts have been drawn on that basis.

(*For complete prices see page* 1350.)

Furnace Coke

Sold For Last Half of This Year — Inquiry is More Active

Pittsburgh, June 13.—The market for blast furnace coke for shipment the second half of this year was opened a few days ago, when a prominent central western consumer closed negotiations for about 25,000 to 30,000 tons of fuel a month for delivery the third and fourth quarters. The tonnage involved, it is understood, commanded from $2.65 to $2.75, ovens, but the latter figure appears to represent the general market for delivery the third and fourth quarters of this year. It is understood that several other large tonnages of coke have been sold for shipment after July 1, but complete details have not been announced. A number of prominent blast furnace concerns are actively negotiating for requirements the second half of this year. Inquiries have been sent out for beehive oven coke for August and September delivery by a blast furnace interest, which is completing a by-product coke oven plant.

The market for foundry coke is quiet, but no change in the position of prices is noted. The *Connellsville Courier*, for the week ending June 3, says production of coke in the Connellsville regions was 431,872 tons, compared with 436,812 tons the week previous.

Furnace Inquiry

St. Louis, June 13.—An inquiry for 7,500 tons of furnace coke, which has appeared in the St. Louis district, is the most attractive thing that has taken place in the coke situation for some time. The demand continues to be moderate, with 72-hour Connellsville and Virginia grades held at $3.25, ovens.

Active in South

Birmingham, Ala., June 12.—Coke is very strong with demand from the widest territory it has perhaps ever enjoyed. There is scarcely an idle

oven in Alabama, but, even at that, the output moves as fast as made, car shortage considered, and would move faster and in greater quantities if cars were available. Large wholesale lots of standard foundry coke bring $4 to $4.25 and $4.50 is the rule for small shipments.

Shape Business Easier

Deliveries of Structural Material Improving and Highest Quotations for Prompt Delivery Disappearing

Philadelphia, June 12.—Prompter deliveries on structural shapes continue to be made by several makers and premiums for early shipment are less in evidence. One large maker in this district has been taking contracts for third quarter specification at 2.50c, Pittsburgh, or 2.659c, Philadelphia, for the bar mill sizes and at 2.60c, Pittsburgh, for the larger sections, shipment to be made at the convenience of the producer. So far, this maker has been able to make shipments promptly. Another Pennsylvania mill which had been quoting up to 3.50c, Pittsburgh, now is offering bessemer shapes for comparatively early delivery under 3.00c, Pittsburgh, and a price of 2.50c has been reported. A jobber in this district has dropped his price from 3.25c to 3.00c, delivered, to move a considerable stock. Eastern Pennsylvania shape mills, as a rule, are not catching up on deliveries in any noticeable degree, but it is noted that certain sizes can be inserted into schedules more freely. New business in this district the past week has been somewhat livelier in a miscellaneous way. Specifications are active.

Expect Quiet Summer

New York, June 13.—Miscellaneous inquiries and lettings in fabricated steel show up better in tonnage and a number of the eastern railroads again are figuring more freely on bridge work, but the situation shows no appreciable improvement of a general character. As the fabricators are working out their lower-priced contracts for plain material, they of necessity are raising their quotations to correspond to the higher mill figures. These rising prices act as a restraint on many building undertakings. Leading fabricators are looking forward to a comparatively quiet summer. Definite plans now are being prepared for the proposed new hotel by New York Central railroad interests, probably 15,000 tons, and it is stated unofficially that Post & McCord have the erection contract which means the American Bridge Co. will furnish the steel. In the export market, the French commission has inquired for 1,750 tons of beam work. Some shape makers continue to offer material for earlier delivery periods at concessions from the premium figures previously quoted. Orders at 3c, Pittsburgh, or 3.169c, New York, are fewer, but the New York market still rules from 2.50c to 3c, Pittsburgh, or 2.669c to 3.169c, delivered.

Prompt Shapes Lower

Pittsburgh, June 13.—The outstanding feature of the market for structural material this week is the offering of bessemer structural shapes for rather prompt delievery at 2.50c, the price prevailing for shipment at the convenience of the mill. Bessemer shapes have been offered in western Pennsylvania and eastern Ohio for delivery in four to six weeks at 2.50c rather freely by one interest. Most mills in this district are not in a position to promise structural material until the fourth quarter of the year. No large structural projects are under consideration in the Greater Pittsburgh district.

Structurals More Active

Chicago, June 13.—A somewhat more active market for structural shapes is being experienced. It is coming mostly from railroads and industrial concerns. During the past week, the Decatur Bridge Co. booked 2,500 tons for the open hearth plant of the Keystone Steel & Wire Co. at Peoria, and the American Bridge Co. booked 100 tons for a trestle at the duplex plant of the Illinois Steel Co. at South Chicago.

The largest individual tonnage now under consideration by fabricators in this territory is about 3,000 tons for the new steel plant of the Mark Mfg. Co. at Indiana Harbor. It is said that about half this tonnage may go in Bethlehem sections in order to obtain prompt delivery.

CONTRACTS AWARDED

Keystone Steel & Wire Co., open-hearth plant, Peoria, Ill., 2,500 tons to Decatur Bridge Co.

High school building, Eveleth, Minn., 110 tons, to American Bridge Co.

Chicago, Milwaukee & St. Paul Railroad Co., Lake street subway and South Water street subway, Milwaukee, Wis., 111 tons, to Wisconsin Bridge & Iron Co.

Illinois Steel Co., trestle to charging floor of duplex open-hearth plant at South Works, South Chicago, Ill., 100 tons to American Bridge Co.

Wabash Railroad Co., three girder bridges, Attica, Ind., and Toledo, O., 266 tons, to American Bridge Co.

Power house for the United Electric Light & Power Co., Springfield, Mass., 800 tons, to L. F. Shoemaker & Co.

Office building at Washington, D. C., for Southern railway, 850 tons, to McClintic-Marshall Co.

Bridges for Central Railroad of New Jersey, 200 tons, to American Bridge Co.

Building for Raritan Copper Co., Perth Amboy, N. J., 200 tons, to independent shop.

Buildings for the Worth Bros. Co., Coatesville, Pa., 1,400 tons, steel work placed with the Eastern Steel Co. by Irwin & Leighton, the general contractor.

Residence for E. T. Stotesbury, Chestnut Hill, Pa., 400 tons, general contract to the Geo. A. Fuller Co.

Building for the New York Telephone Co., Walker & Lispenard streets, New York City, 1,100 tons, to Levering & Gerrigues.

Sugar mill in Cuba, 400 to 500 tons, to the Virginia Bridge & Iron Co.

CONTRACTS PENDING.

Pier for City of New York, Fifty-fifth street and North river, about 2,000 tons, bids being taken.

Alterations to Kings county court house, Brooklyn, 350 tons, bids being taken.

Bridge for Southern railroad over James river, near Richmond, 500 tons, bids being taken.

Apartment, New Haven, Conn., 300 tons, bids being taken.

Bridge over barge canal at Rochester, N. Y., for Erie railroad, 600 tons, decision still pending.

Highway bridge over Salem river, Salem, N. J., 250 tons, bids being taken.

Bridge work for Lehigh Valley railroad, 1,000 tons, bids entered.

Connection of Seventh avenue subway with Pennsylvania railroad terminal, New York City, 300 tons, decision still pending.

Bridge work for Pennsylvania railroad, 500 tons, bids being taken.

Bridge work for Boston & Albany, 200 tons, bids being taken.

Ten small bridges for the New York Central & Hudson River railroad, 250 tons, bids being taken.

Two additional buildings for the Sun Ship Building Co., Chester, Pa., 1,000 tons, bids being taken.

Apartment for Bing & Bing, New York City, location not given, 600 tons, bids being taken.

Office building, 122 Pearl street, for the Cruikshank Co., 500 tons, bids being taken.

Settlement house, Barrow street, New York City, 500 tons, bids being taken.

Oil station for the Pure Oil Co., Carroll street, Brooklyn, 350 tons, bids being taken.

Apartment for J. J. Hearn, West Fifty-fifth street, New York City, 450 tons, bids being taken.

F. F. Dalley Corporations, Ltd., Hamilton, Ont., new factory addition, Military road, Buffalo, five stories and basement, 90 x 80 feet, reinforced concrete, taking about 300 tons reinforcing bars.

Bridge across the Grand Calumet river, Hammond, Ind. Plans not published.

Bridge across Wabash river to be built by Wabash county, Ind. Four hundred tons structural and re-inforcing steel.

Bridge to cost $49,780 to be built by Hamilton county, at Woodlawn, a suburb of Cincinnati. Three hundred tons of structural and re-inforcing steel will be needed.

New Y. M. C. A. building at Cincinnati, to cost $450,000. Bids to be let this week. One thousand tons structural and re-inforcing steel required.

(*For complete prices see page* 1350.)

Heavy Plate Tonnages

For Both Domestic and Foreign Buyers Are Being Received—Prices in the East Are Very Firm

Philadelphia, June 12.—Heavy tonnages both for domestic and foreign buyers are coming before eastern Pennsylvania plate makers without interruption. Large home users have been among the buyers, including the Pennsylvania railroad, which has closed with an eastern Pennsylvania maker for another round tonnage for this year's delivery at Altoona at 3.75c, Pittsburgh, and still is in the market. A Pacific coast shipyard is inquiring for 8,000 tons, a Nova Scotia car builder for 5,000 tons for nearby, British shipyards for 5,000 tons and other lots and another domestic proposition for 10,000 tons is current. The Sun Shipbuilding Co., which is credited with having booked two boats for its new yard, is in the market for some tonnage. Other important buyers are figuring actively. Some of the eastern mills continue to close contracts for specification in the third and fourth quarters and against definite needs for next year at 4.00c, Pittsburgh, or 4.159c, Philadelphia. These contracts are stipulated to be non-cancellable and not to permit of any changes in the sizes. One seller will accept 3.75c, Pittsburgh, for fourth quarter, but asks 4.00c for prompt. Prices are strong. In the controversy over marine boiler steel specifications, the government has offered concessions to the mills by agreeing to eliminate the reduction of area requirements, one point in dispute, pending a full investigation of the question. This is not satisfactory to the producers, who insist that all the modifications recently asked for are necessary before they will furnish further steel of this description.

Prompt Plates Offered

Pittsburgh, June 13.—Steel plates for rather prompt delivery now are being offered at 4c, and reports are heard of sales at as low as 3.75c. These figures are about $5 a ton below prices obtained a short time ago. Plates for delivery at the convenience of the mill continue to be sold at from 2.75c to 2.90c. Most mills are unable to promise shipments in less than six months, although some plants in western Pennsylvania are not in a position to meet specifications for rather quick shipment.

One in close touch with the railroad situation told *The Iron Trade Review* that leading trunk line carriers may not need additional cars this year, if the traffic situation can be relieved in all parts of the country. In other words, if cars that have been standing on sidings can be released, it is not likely that many additional new cars will be purchased this year. Railroads have complained for some time about the high cost of rolling stock and it is almost certain that they will not buy, unless forced to do so.

May Close Plants

Cleveland, June 13. — Some boiler manufacturers declare that they will not pay the high prices now being asked and will close their plants rather than do so. Leading companies are selling plates at 2.75 to 2.90c, for delivery at the convenience of the mill. One steel company is quoting 3.50c for fairly prompt delivery. Leading independent mills of the east still adhere to the 4c, Pittsburgh, quotation and will not guarantee delivery in less than six months.

Plates Continue Strong

Chicago, June 13.—Conditions in the steel market for plates continue unchanged and some interests are willing to book material for delivery during first half of 1917 at the present nominal price of 3.09c, Chicago. Smaller mills in the east, which have avoided contracts and have been selling for prompt delivery at considerable premium, are now willing to take tonnage at 3.25c to 3.50c, Pittsburgh, most of the business being close to the minimum figure. This is a decided recession from former large premiums and is the result of reduced buying at the high price.

Cold Rolled Strip Steel

Pittsburgh, June 13.—Since consumers have covered requirements for the second half of this year, the market for cold rolled strip steel is quiet. Small tonnages are being sold at a range from 6c to 6.50c, base, for delivery the last six months of the year.

Nuts, Bolts and Rivets

Pittsburgh, June 13.—Manufacturers of nuts, bolts and rivets are unable to promise deliveries in less than four months. Specifications from domestic consumers are decidedly heavy and some export business is enjoyed. Most manufacturers in western Pennsylvania, however, have been unable to entertain inquiries for foreign shipment. Car and ship builders are taking heavy tonnages of rivets.

(*For complete prices see page* 1350.)

Cast Iron Pipe

Former Schedule in East Restored — Business Not Stimulated

New York, June 13.—Recent reductions of $1 a ton in cast iron pipe in the eastern market have been short-lived. After having been in effect for a week or 10 days, these now have been withdrawn and the former schedule, which is on the basis of $30.50, New York, for 6 and 8's and $33.50 for 4's, has been restored. The purpose of this reduction apparently was to stimulate new buying and if this be true, it has failed to exercise the desired effect, for the market remains quiet and new business is moderate. Private inquiries are fair. The United States Cast Iron Pipe & Foundry Co. has taken 1,000 tons of 6 and 8's for Santos, Brazil, and there is further tonnage in the market for the same destination.

Buy Pipe Sparingly

Chicago, June 13.—Buying of cast iron pipe is not being done on a heavy scale, as has been the case throughout the present year. The United States Cast Iron Pipe & Foundry Co. has taken 130 tons of 72-inch pipe at Logansport, Ind.

Bids were to be opened at Decatur, Ill., June 12 on 400 tons, and at Sheboygan Falls, Wis., on 350 tons, while figures will be taken June 15 at Kansas City, Mo., on 800 tons.

Healthy Tone

Birmingham, Ala., June 12.—The Alabama pipe makers were in most instances in line with the general easing of $1 per ton in price before some other sections, quotations having been marked down about May 1. A very satisfactory volume of business has come from the south and west and altogether quite a healthy tone prevails. No large contracts have been heard of in some time. The filling in orders, however, keep plants going as usual. The sanitary pipe plant field is also reported as in fair shape.

L. F. Jordan has been elected president of the Pennsylvania Tank Car Co., Sharon, Pa. Osborne Mitchell, who had acted as temporary president, will continue as general counsel for the company.

Decided Lull in Sheets

Inquiries Are Few and Mostly From Customers Who Are Sounding the Market—Galvanized Irregular

Youngstown, O., June 13.—Sheet mills are receiving fewer inquiries for sheets than at any time in months. As pointed out at the time, the volume of inquiry began to slacken several weeks ago. This decrease has been cumulative during succeeding weeks. Many of the inquiries now received are from customers who are sounding the market and who refrain from placing business after the mills have furnished quotations. On the other hand, specifications are coming in freely. Sheet mill interests believe the present lull is temporary, and results largely from the desire of consumers to hold off new buying until after the July 1 inventory period. Those consumers who are buying now, generally pay current quotations willingly and show little disposition to haggle about prices.

Galvanized sheets continue to attract interest. One mill sold more of the coated product this week than during any corresponding period in months. Sagging prices of spelter have brought about another drop in the price of galvanized sheets, which are now quoted at 4.65c to 4.75c. The minimum figure, and even 4.60c, has been named on the heavy gages, while No. 28 gage would probably bring a figure above 4.75c. Few mills are rolling the lighter gages, preferring to concentrate on heavier stock.

Black sheets are firm at 2.90c to 3c, most mills asking the higher figure. In this grade, also, the heavier gages are more attractive to the mills and in one case no sheets lighter than No. 16 gage are being rolled. Blue annealed sheets continue to range from 3c to 3.25c, the latter figure representing No. 10 gage and the minimum quotation the lighter gages.

The need of conserving their sheet bar supply has resulted in some mills accepting few orders for light stock. One mill has just shipped a small tonnage of ¼-inch plates, for which it received 4c. No new contracts for sheet bars for fourth quarter delivery have been drawn up, but it is the general impression that raw steel for that delivery will sell at $42 to $44 and even $45.

Little Buying

Pittsburgh, June 13. — Demand for steel sheets continues decidedly heavy, but no new buying of consequence is reported. One of the larger mills in this district has sold rather heavy tonnages of black sheets on the basis of 3.05c for No. 28 gage, although reports of that figure being shaded from $1 to $3 a ton are heard.

Irregularity features the market for galvanized products, which have been sold at as low as 4.75c in isolated cases recently. Blue annealed sheet products are decidedly strong, with some tonnages commanding more than 3.25c for No. 10 gage. It generally is believed that the market will reflect further strength the third quarter, when manufacturers will be paying higher prices for sheet bars than at present.

Independent manufacturers, who pay the Amalgamated association wage scale, are watching developments at Atlantic City, where officials of the Amalgamated asociation are conferring with representatives of sheet and tin plate makers in an effort to adopt wage scales for the year beginning July 1, next.

Pennsy Wants Car Sheets

Philadelphia, June 12.—An inquiry is pending from the Pennsylvania railroad for 1,000 to 2,000 tons of heavy blue annealed sheets for coach construction at Altoona. Delivery is wanted for this year. One of the leading eastern Pennsylvania sheet makers is practically sold out for this year. Others can supply a fair tonnage for late in the year. Sales of blue annealed No. 10 gage for early delivery have been closed at 4.00c, Pittsburgh, or 4.159c, Philadelphia, and the market's spread is from 3.75c to that figure.

More Irregularity

Cleveland, June 13.—The galvanized sheet market is showing more irregularity and as low as 4.65c on No. 28 has been quoted. While the ordinary quotation on No. 10 blue annealed is 3 to 3.25c, at least one Cleveland mill is getting as high as 3.70c for No. 10 black for prompt delivery.

Blue Annealed Strong

Chicago, July 13.—Black sheets have lagged somewhat and may be bought as low as 3.04c, Chicago mill, while blue annealed are strong and are commanding 3.19c to 3.44c, Chicago mill. Demand for the latter continues excellent and mills are booked far ahead on this variety. Galvanized sheets are somewhat lower and are quoted at 4.94c, Chicago mill, after having been about $2 per ton lower.

(*For complete prices see page* 1350.)

Tin Plate Gains Strength

Pittsburgh, June 13.—Further strength is reflected by the tin plate market and it is likely that all quotations below $6 will disappear before July 1. Specifications from domestic consumers are heavy and large tonnages are involved in pending inquiries for export.

Domestic Ferro

Still Has Important Influence — Prices Are Irregular

New York, June 13.—Domestic metal continues largely to dominate the ferro-manganese market and prices still are following an irregular course. For spot delivery, domestic ferro-manganese is quoted from $225 to $250, furnace. Four carloads from a western producer have been offered in this territory the past week within this range. The forward market on the domestic product is not so well defined. Some of the producers will not sell on contract and are making offerings at the current market only in accordance with the ore now on hand. Some evidences of shading of the official price of $175, seaboard, for English ferro-manganese for 1917 delivery, have appeared. One producer has made quotations for that period of $172, seaboard. Prompt English metal, of which there now are few sales, is held around $300, seaboard.

New business in the manganese metals has remained limited, but several large buyers have been showing interest in their forward requirements. A 3,000-ton lot for a Youngstown consumer for last half now is reported to have been withdrawn. As previously noted, another consumer in the same district recently bought 1,200 tons for last half. The Algoma Steel Corporation, which is credited with having taken 3,000 tons of spiegeleisen in this country, now is said also to have purchased on this side 1,000 tons of ferro-manganese in addition. There are two or three inquiries for 500 tons each in the middle west.

Spiegeleisen has been less active. There is more price softness in this metal, which is quoted from $55 to $60, furnace, for standard 20 per cent.

Disagree on Prices

Pittsburgh, June 13.—Several consumers are understood to be negotiating for manganese for prompt and future delivery, although no large tonnages have been sold in the open market this week. Sellers and buy-

ers of this material disagree as to the position of prices, sales and offers being reported all the way from $250 to $325, seaboard, for prompt shipment. Demand for other alloys has fallen off slightly and prices are not so high as they were a few weeks ago. Twenty per cent spiegeleisen is being held at $60, furnace. Prices of steel-making metals, which had been abnormally high, have declined considerably, but quotations still are regarded as nominal.

Will Make Ferro

Frank B. Richards, of M. A. Hanna & Co., Cleveland, has been added to the list of directors of the Seaboard Steel & Manganese Corporation, recently organized to acquire the Temple, Pa., blast furnace for the manufacture of ferro-manganese and spiegeleisen. The blast furnace at Temple, Pa., was for many years the property of the Temple Iron Co., and later of the Delaware Steel & Ordnance Co. The management will be under Albert Broden, as in the past. The officers are: Hartley C. Wolle, president; Albert Broden, vice president; John E. Sullivan, secretary and treasurer. Directors are: Lloyd H. Atkinson, Albert Broden, Melvin P. Dalton, William R. Hopkins, Frank B. Richards, John E. Sullivan and Hartley C. Wolle.

Discussing Scale

Officers of the Amalgamated Association of Iron, Steel and Tin Workers are conferring at Atlantic City this week with manufacturers of sheets and tin plate affected by Amalgamated Association wage scales, in an effort to agree upon wages for the year beginning July 1, next. The conference opened June 12 and will continue until wage scales for the year have been adopted. As soon as sheet and tin plate mill wage scales are adopted, officers of the Amalgamated Association will meet with bar iron manufacturers to agree upon wages in bar iron mills for the year beginning July 1. At the convention of the Amalgamated Association at Cleveland a few weeks ago, wage scales about 15 per cent. above those now prevailing were proposed.

Capital Ten Millions.—Papers of incorporation have been taken out at Dover, Del., by the Mark Mfg. Co., Chicago, with a capitalization of $10,000,000. The formation of this company is in connection with the announced purposes of the Mark company to erect a new steel works at Indiana Harbor, Chicago district.

Wire Products

In Active Demand for Export—Large Order From Russia

New York, June 13.—Russia, which has been a large buyer of wire in this country, is seeking this material more vigorously both under new orders and under contracts previously closed which have been held up. According to current reports, that country now has virtually closed on a recent large inquiry for barbed wire, understood to have been approximately 165,000 tons. In the division of this business, the American Steel & Wire Co. will furnish a large tonnage and a number of independent makers also will share. In addition to such new purchases as have been made, the Russian government now has ordered the release of a heavy quantity of barbed wire remaining unshipped from previous orders and which had been delayed largely by the lack of freight room. The leading maker of wire products now is quoting $4 advance on last quarter contracts, or on the basis of 2.65c, Pittsburgh, for plain wire. Considerable business has been entered on this basis. The third quarter market remains unchanged. Some of the larger makers of wire rods are selling the domestic trade at from $50 to $55, Pittsburgh, but other mills are negotiating for business at $60, Pittsburgh. Export sales usually are a little higher than for domestic account.

Wire Not So Excited

Pittsburgh, June 13.—Specifications for wire products have fallen off slightly the last few weeks, much to the satisfaction of manufacturers who are anxious to build up stocks. Mill stocks have been decidedly light for more than six months and jobbers have not been able to accumulate large tonnages of nails or wire. No change in the position of prices is noted and some people in close touch with the situation do not believe any further changes in quotations will be made until autumn.

Russia, according to reports from New York, has just closed for about 200,000 tons of barbed wire for shipment the next 14 months. While this report could not be confirmed here, it is said that the United States Steel Corporation will furnish the bulk of the tonnage involved.

Safety First Special.—The tentative program for the Western Pennsylvania safety rally, to be held in Pittsburgh, June 19, 20 and 21, has been completed. A feature of the rally will be the exhibition of the United States safety first special train, which will be sent to Pittsburgh by the department of the interior. Dr. John Price Jackson will preside at the meetings, which will be held in Soldiers' Memorial Hall. L. H. Burnett, of the Carnegie Steel Co., Pittsburgh, is chairman of the committee in charge.

(*For complete prices see page* 1350.)

Warehouse Prices

Have Been Revised — Black Sheets Higher in Cleveland Market

Cleveland, June 13.—A leading jobbing house which has been closing out its stock of black sheets on a basis of 2.95c for No. 28 has no more to offer and black sheets are now being sold at 3.20 to 3.25c, quotations which conform more nearly to those in other jobbing centers.

Jobbers Have Troubles

New York, June 13.—Irregularity recently noted in warehouse prices in the metropolitan district, has disappeared. Some principal interests which had not joined in the recent advance of shapes and bars from 3.10c to 3.25c, delivered, and in plates from 4c to 4.25c, now have adopted the higher schedule. The demand for steel from store continues heavy, but the great difficulty of jobbers is to keep up their stock sizes owing to the delayed deliveries of the mills.

Selling Building Materials

Cincinnati, June 13.—Buying of building materials from warehouses continues good. Reinforcing bars are in active demand, as concrete is being used in preference to steel in a large number of building operations, because of present high prices of the latter. Cold rolled bars are quoted at list price, plus 20 per cent, iron and steel bars from 3.20c to 3.75c, and shapes and plates from 3.20c to 3.50c. Warehouses are not selling good tonnages of sheets because the majority of contracts are being taken by the mills direct. No. 10 blue annealed sheets are quoted at 3.50c, black No. 28 gauge at 3.40c, and galvanized No. 28 gauge at 5.25c, all f. o. b. Cincinnati.

Prices Revised

Detroit, June 13.—Detroit warehouses have reduced quotations on blue annealed sheets to 3.55c, and on No. 28 galvanized to 5.25c. The former quotation of 4c on No. 10 blue annealed was out of line with quotations in other distributing points not far distant from Detroit. Galvanized sheets have weakened somewhat, on account of the decline in spelter.

Scrap Prices Are Lower

Heavy Melting Steel Bought From a Steel Works—Carnegie Steel Co. Buys Machine Shop Turnings

Pittsburgh, June 13. — Several consumers of heavy melting steel recently have refused to pay $16 a ton and that figure now represents the minimum market price of that grade in this district. It develops that one of the more prominent consumers of scrap about six weeks ago obtained a large tonnage of heavy melting steel from a steel works interest in this district. The tonnage was sold under rather unusual circumstances and the transaction did not affect the general market. The Carnegie Steel Co. has purchased about 10,000 tons of machine shop turnings, buying some of the material at as low as $10 a ton. Borings have declined to $9.25 a ton and other grades are correspondingly weak.

Buffalo Prices Sag

Buffalo, June 13.—For the time being, a sharp falling off in prices is noted in the Buffalo district, affecting most of the lines in the list. Yards here had held up their schedules against an anticipated increased demand and consequent advance in prices, but the absence of the demand looked for and the presence of many embargoes at the plants of large consumers, has caused the re-sale of many tonnages at off prices in order to escape demurrage. Heavy melting steel has dropped to $15.50 to $16; railroad wrought scrap to $17.25 to $17.75; car wheels to $13.50 to $14; railroad malleable to $15 to $15.50; machine shop turnings to $7 to $7.50; cast iron borings to $8 to $8.25; bundled sheet scrap and grate bars to $11.50 to $12; stove plate, net, and No. 2 busheling scrap to $11 to $11.50; wrought pipe to $12 to $12.50, and No. 1 busheling scrap to $13 to $13.50.

Prices are Soft

Philadelphia, June 12. — Bargain prices continue to fix the current market on iron and steel scrap in this territory, as buyers remain indifferent unless they are granted concessions. The general attitude of consumers appear to be that they have so much tonnage in stock or now being shipped, that they are adverse to increasing their obligations unless the proposition is made attractive. More material is coming out for sale than the market readily is taking up, with the result that prices are soft and are quotably lower. Small quantities of heavy melting steel have gone to brokers under $16, delivered, eastern Pennsylvania. Turnings continue to be offered in volume and are hard to sell. The embargo against the Lukens Iron & Steel Co., Coatesville, Pa., has been restored and that at Harrisburg by the Pennsylvania railroad remains in force.

In Sad Condition

New York, June 13.—An expression "shot to pieces" portrays the condition which prevails in the iron and steel scrap market in this district. Buying by consumers seems to have been suspended completely and it is difficult to ascertain the real level of prices, but they are lower all around. Wrought pipe has dropped $1 in the week and there have been other similar reductions. Some offers for turnings of about $6.25, New York, came from the Pittsburgh district but these, subsequently, were withdrawn. Steel axles which are in some local demand, are about the only grade that has not declined sharply.

Low at Cincinnati

Cincinnati, June 13.—Not only have users of iron and steel scrap withdrawn completely from the market as far as buying is concerned, but they are also requesting that shipments be withheld in a large number of cases. This is because many consumers are over-bought, and find they cannot use the tonnages they have purchased as fast as expected. The scrap iron market is quiet and exceptionally weak. Lack of transactions has made prices so uncertain that separate quotations are being given on each sale.

Extremely Dull

Cleveland, June 13.—A period of severe dullness has arrived in the scrap market in this district and in the Mahoning and Shenango valleys. The situation is said to be worse than at any time during the past few months. Material is moving only in small, unimportant dribbles; shipments being held up in some instances, and in others, embargoes are the deterrent elements. The mills are not buying in large tonnages in these days; in fact, the latest spurt of the Carnegie Steel Co.'s purchase of 10,000 tons of machine shop turnings for its blast furnaces had progressed for several days and had almost reached its end with such quietness that some important dealers in this city were unaware a large purchase was being negotiated. In passing it may be said this purchase had a neglible effect on the price of turnings in the local market. Both turnings and borings are as low today as at any time in the past year. The market on heavy melting steel is weak and unstable, being quoted at $15.50 to $15.75.

A temporary embargo on scrap has been placed against the Upson Nut Co., Cleveland, and at two other local mills previously mentioned in these columns. Shipments are asked to be withheld from two mills.

Chicago Scrap Weaker

Chicago, June 13.—Decided recession has been made in scrap iron and steel products in Chicago during the past week. No factor is seen which is likely to give strength to the market. Large consumers have remained consistently out of the market and practically no buying is being done. Dealers who have hoped and believed that a buying movement must come soon have almost given up that idea. Some heavy steel scrap has been sold for shipment to Ohio, but this has not been sufficient to relieve the situation.

Heavy melting steel has been sold at $15 to $15.50 and shoveling steel is at $1 per ton lower than this figure.

Railroad offerings are moderate, but spring track work and renewals have thrown tonnages of long steel rails into the market and almost every list contains considerable of this item. The Chicago, Milwaukee & St. Paul railroad offers 2,700 tons, of which 1,500 tons are long steel rails; the Michigan Central offers 2,600 tons, including 850 tons of rails; the Chicago, Peoria & St. Louis railroad is offering 1,025 tons; the Southern railway has issued a list containing 5,350 tons, of which 500 tons is steel rails; the Union Pacific offers 4,000 tons.

Still Drags

St. Louis, June 13.—The scrap market continues to drag, and the outlook is for lower prices for the next week or so. Consumers appear to be able to limit their purchases to what was offered under the necessity of selling and as a consequence their offers are lower, following each transaction. It seems to be apparent, however, that tonnages in the yards of consumers are decreasing daily, and it is expected that large consumers shortly will come into the market, which will have a tendency to strengthen prices. The only railroad offerings on the market are: Southern Railway, 850 tons; Big Four, 3,750

(*For complete prices see page* 1350.)

tons, of which 500 tons are long length steel rails, and 750 tons No. 1 railroad wrought.

Bargain Prices Prevail

Birmingham, Ala., June 13.—The scrap market has done very little good for itself in several weeks. Bargain prices prevail in actual transactions. Steel and wrought scrap are both marked down again. The enormous quantity on hand is moving slowly.

Pipe Mills

Are Sold Up Far Into Future—Some Deliveries Deferred a Year

Pittsburgh, June 13.—Several manufacturers of iron and steel pipe are not in a position to promise deliveries of some sizes for almost a year. Manufacturers are not soliciting additional tonnages and no large inquiries are pending in this district. Interest is manifested in the proposed pipe line of the Sinclair Oil & Refining Co., mentioned in last week's issue of *The Iron Trade Review.*

Specifications for merchant and locomotive boiler tubes are heavy; deliveries, in some instances, are deferred 12 months. Mills cannot promise seamless tubes in less than from seven to 12 months.

Coke Inquiry

Cincinnati, June 13.—Southern furnaces are beginning to make inquiry regarding coke prices, but have not as yet actively entered the market. It is known that several stacks in the south that have recently blown in have not enough coke purchased to carry them through the remainder of this year. Furnace operators, as a rule, are complaining that the present prices of coke are too high, and state that they would be out for good tonnages if proper concessions were made. Activity in foundry coke is at a minimum, but shipments of this grade on old contracts are heavy. Wise county and Pocahontas furnace coke are quoted from $3 to $3.25 ovens, and New River furnace coke from $3.25 to $3.50 ovens, all for contract delivery.

J. P. Dawley, one of the most prominent attorneys of Cleveland, died in Charity hospital, that city, June 7, after an illness of several weeks. For many years, Mr. Dawley represented various organizations of manufacturers in the central west. He was 69 years old.

Ore Shipments

Are Very Heavy — Labor Disturbance Promptly Suppressed

Cleveland, June 13.—Iron ore shipments are extremely heavy and the outlook is that June will show a movement considerably heavier than the record-breaking tonnage of May. Shippers are freely bidding $1 per ton to move ore from the head of the lakes. Even higher rates are expected to prevail.

Efforts of the I. W. W. to organize miners in the neighborhood of Virginia, Minn., caused a rather serious condition for a few days recently, but ring leaders in the disturbance were arrested and quiet has since prevailed. For most part, the iron miners are satisfied and do not care to join the I. W. W. or any other labor organization.

Boilermakers

Will Hold Annual Convention at Cleveland Next Week

A large attendance of the leading boiler manufacturers of the country is expected at the 28th annual convention of the American Boiler Manufacturers' Association, which opens at Cleveland June 19. The association will be in session two days, headquarters being at the Hollenden hotel.

Two subjects of great interest to the boiler trade, uniform cost systems and the uniform boiler code, will be discussed. Data will be presented, showing the need of boiler manufacturers adopting uniform cost keeping methods. The uniform boiler code is that which was drawn up by the American Society of Mechanical Engineers. A committee was appointed last year by the American Boiler Manufacturers' Association to cooperate with other similar organizations in promoting the wider adoption of this code. The report of this committee is being awaited with interest.

W. C. Connelly, president of the D. Connelly Boiler Co., Cleveland, is president of the association and will preside at its sessions.

Dr. J. S. Unger, of the research bureau of the Carnegie Steel Co., Pittsburgh, will present a paper on "The Effect of Sulphur in Steel." Motion pictures, prepared by the National Tube Co., showing the manufacture of pipes and tubes from the ore mine to the finishing mill will be shown.

Organizes Foundry Company.—The Bay City Foundry & Machine Co., Bay City, Mich., has been organized by A. C. Howlett, formerly general superintendent of the Industrial Works. He has been elected vice president and general manager of the new company which takes over the business and plant of the M. Cartland Co. John C. Ross has been elected president, W. W. Chapman, secretary, and Norris Wentworth, treasurer. A large amount of new equipment will be purchased.

(*For complete prices see page* 1350.)

Penn Mary Steel Co. Incorporated

Harrisburg, Pa., June 14. (By wire.)—The Penn Mary Steel Co., of South Bethlehem, has been incorporated at Harrisburg with a capital of $1,000,000 by H. S. Snyder, W. F. Roberts, B. H. Jones and others identified with the Bethlehem interests. The company is said to be part of a plan for a holding company for the Pennsylvania Steel Co. and the Maryland Steel Co., which were recently taken over by the Bethlehem interests.

Will Build Open Hearth Plant

Chicago, June 13.—Interstate Iron & Steel Co. will begin construction shortly of an open-hearth plant at East Chicago, Ill., in connection with its bar iron mill. The plant is laid out for eight furnaces, but only two are to be constructed at present, each of 70 tons capacity.

The company plans to build later a 32-inch blooming mill and an auxiliary mill of a type not yet determined. It is planned to roll from the billet to small sections on the initial heat by this combination.

Will Build Steel Foundry

Chicago, June 12. — The Superior Steel Castings Co. has been incorporated in Michigan with $60,000 capital stock and will build a steel foundry at Benton Harbor, Mich. Ten acres have been bought and the first building, which will be erected this summer, will be 130 x 200 feet. An open-hearth furnace and foundry will be equipped and other furnaces added as necessity demands. The capacity of the first furnace has not yet been determined.

The stock is held by H. E. Goodman, Charles A. Pratt and Charles H. Strawbridge, all of whom are interested in the Goodman Mfg. Co., of Chicago. S. E. Doster and W. R. Gilmore, practical steel castings men, are associated with the company. The output will be taken by the Goodman Mfg. Co., manufacturer of mining machinery, and some capacity may be available for taking on outside work.

Very Few Orders for Cars

Are Being Placed by Railroads—Important Inquiries From Foreign Countries Pending

New York, June 13.—A policy of buying no cars at prevailing prices except those where the need cannot be avoided contiuues to be followed by the railroads. The past week has brought out orders for these absolute necessities totaling about 2,000 cars, but it scarcely signifies a real improvement in this branch of the equipment market. Some of the larger systems, such as the Pennsylvania lines, continue to sound out builders on prices, but it is not believed likely that they will enter into any contracts at the prevailing market. The Pennsylvania has put out no definite inquiries and reports that it will buy 5,000 cars are premature. The Virginian railroad is a prospective buyer of anywhere from 1,000 to 10,000 of a new type of 120-ton hopper car, of which it has ordered samples from several builders. When these are delivered, it will determine whether to buy these cars.

New car orders placed in the week include:

Baltimore & Ohio, 1,000 box to the Haskell & Barker Car Mfg. Co.

Denver & Rio Grande, 500 box to the Pullman Co.

New York, Chicago & St. Louis, 500 repairs and 500 center construction to the Pressed Steel Car Co.

Seaboard Air Line, 30 cabooses to the Standard Steel Car Co.

Gasolene Corporation, 25 tank to the German-American Car Co. and 25 tank to the American Car & Foundry Co.

The Southern railway is reported to have ordered an additional 1,000 box cars from its Lenoir City, Tenn., shops.

Large foreign inquiries for cars and locomotives for Russia, France and other countries, continue in the market. The announcement of the floating of a new Russian loan in this country may hasten the placing of some of the open requirements of that country.

The Southern railway finally has closed for 10,000 tons of rails with the Maryland Steel Co., for 1917 delivery, which was arranged for some time ago. Some new export matters in rails for Russia and France are pending.

Some Box Cars Sold

Chicago, June 13.—The inquiry of the Baltimore & Ohio railroad for 1,000 box cars has resulted in the business being placed with the Haskell & Barker Car Co. The same builders have an order for 500 box cars from another buyer, whose name is withheld. The Baltimore & Ohio railroad is also inquiring for 1,000 steel underframes.

The situation in the car building industry is peculiar and may result in many plants running extremely light at the end of the year or in possible shut-downs for lack of material. While all builders have much business on their books, they are unable to obtain sufficient steel, much being booked for delivery early in 1917, and it is believed present stocks and last half deliveries may be worked up into finished form before first half steel begins delivery.

A Russian inquiry for 30,000 box cars has become active again and it is believed at least 5,000 of these may be closed during the present month, matters of financing having been cleared up.

Large Russian Inquiry

Kingston, Ont., June 13.—The original locomotive plant of the Canadian Locomotive Co. is still engaged in the manufacture of locomotives, and has bright prospects of sharing in some of the numerous orders which are now being placed in this line. An inquiry for from 600 to 1,000 locomotives has been sent out by the Russian ministry. The engines are to be of the same type as those ordered in 1915 and will cost in the neighborhood of $30,000 each.

May Buy Equipment

The Ohio utilities commission has issued permission to the Big Four railroad to purchase equipment amounting to $2,000,000, as follows: One thousand steel hopper cars, 25 Mikado type locomotives and 15 steel passenger coaches.

Rumors as to Worths' Plans

Reports that W. P. Worth, J. Sharpless Worth and associates, have decided upon a large tract of ground near Claymont, Del., just outside of the Pennsylvania state line and 18 miles from Philadelphia as a site for their proposed steel works, remains to be confirmed. This is one of the tracts of ground which the Worth interests have had under consideration. The land is known as the Clyde farm and has been held by the Philadelphia, Baltimore & Washington railroad. It comprises a large tract which fronts along the Delaware river. No official announcements of their plans have been made by the Worth interests. A suite of offices now is being arranged in the Commercial Trust building, Philadelphia, for the new company.

(*For complete prices see page* 1350.)

Benzol Market

Has Developed Firmer Conditions — No Spot Toluol Offered

New York, June 12.—A firmer condition of prices has developed in the pure benzol market. Selling by buyers who recently have been marketing some of their stocks is much smaller as their own needs now are more nearly equal to their supplies. As a result, spot benzol is stronger and 75 cents per gallon now is the minimum of the most important sellers against 70 cents a week ago. Some contracting is going on steadily at unchanged prices with good prospects for greater activity. More numerous inquiries for toluol for delivery over the remainder of the year, are appearing. These inquiries are both foreign and domestic. The latter are from manufacturers of explosives who are figuring upon new contracts with European governments. Practically no spot toluol is offered and some producers, short on deliveries, are buying from competitors. One seller has been trying to satisfy a need of over 10,000,000 gallons. Spot toluol now is quoted at $4.75 per gallon. The tendency in solvent naphtha is toward increased demand with the free supply limited.

Buyers and sellers of sulphate of ammonia still are maneuvering for prices on annual contracts and no business of this kind yet has been closed. The market is very quiet with small demand for nearby shipment. Recent inquiries from Greece have brought no results.

The current quotations per gallon at the maker's plant on leading coke oven by-products, are as follows:

Pure benzol, spot	$0.75 to .80
Pure benzol, contract	.70
Toluol, spot	4.75
Toluol, contract	4.50
Solvent naptha, spot	.45 to .50
Solvent naptha, contract	.40 to .45

Sulphate of ammonia is $3.45 per 100 pounds at tidewater.

Still Extending.—The Phillips Sheet & Tin Plate Co., Weirton, W. Va., has completed plans for further extensions to its plant. A 10-inch strip steel mill will be added. The company now is building a 16-inch strip steel mill, which will be completed in August.

Nearly Ten Million

Is Tonnage of Unfilled Orders of Steel Corporation

The United States Steel Corporation now is short by only 62,202 tons of an order book of the tremendous total of 10,000,000 tons, according to the monthly statement of tonnage issued at New York on Saturday. This statement showed a total of business awaiting shipment on May 31 of 9,937,798 tons, an increase of 108,247 tons over April. This increase, while small, in comparison with other recent months, represents the climax of a remarkable growth in new business which since Aug. 31, 1915, has raised the unfilled business of the Steel Corporation by approximately 5,000,000 tons. The May increase about meets with general expectations.

The unfilled orders of the Steel Corporation at the close of each month in recent years, showing the changes in tonnage and per cent are as follows:

Date.	Total.	Change, tonnage.	Change, per cent.
May 31, 1916....	9,937,798	108,247+	1.11+
Apr. 30, 1916....	9,829,551	498,550+	5.34+
Mar. 31, 1916....	9,331,001	762,035+	8.89+
Feb. 29, 1916....	8,568,767	646,199+	8.16+
Jan. 31, 1916....	7,922,767	119,547+	1.53+
Dec. 31, 1915....	7,803,220	616,731+	8.58+
Nov. 30, 1915....	7,189,489	1,024,037+	16.63+
Oct. 31, 1915....	6,165,453	847,834+	14.06+
Sep. 30, 1915....	5,317,618	409,163+	8.13+
Aug. 31, 1915....	4,908,455	20,085—	0.04—
July 31, 1915....	4,928,640	250,344+	5.35+
June 30, 1915....	4,678,196	413,598+	9.69+
May 31, 1915....	4,264,598	102,354+	2.46+
Apr. 30, 1915....	4,162,244	93,505—	2.21—
Mar. 31, 1915....	4,255,749	89,622—	2.06—
Feb. 28, 1915....	4,345,371	96,800+	2.28+
Jan. 31, 1915....	4,248,571	411,928+	10.74+
Dec. 31, 1914....	3,836,643	512,051+	15.40+
Nov. 30, 1914....	3,324,592	136,505—	3.94—
Oct. 31, 1914....	3,461,097	326,570—	8.62—
Sep. 30, 1914....	3,787,667	425,664—	10.01—
Aug. 31, 1914....	4,213,331	54,742+	1.32+
July 31, 1914....	4,158,589	125,732+	3.12+
June 30, 1914....	4,032,857	34,697+	0.86+
May 31, 1914....	3,998,160	278,908—	6.98—
Apr. 30, 1914....	4,277,068	376,757—	8.09—
Mar. 31, 1914....	4,653,825	372,615—	7.42—
Feb. 28, 1914....	5,026,440	412,760+	8.95+
Jan. 31, 1914....	4,613,680	331,572+	7.74+
Dec. 31, 1913....	4,282,108	114,239—	2.59—
Nov. 30, 1913....	4,396,347	117,420—	2.60—
Oct. 31, 1913....	4,513,767	490,018—	9.79—
Sep. 30, 1913....	5,003,785	219,683—	4.24—
Aug. 31, 1913....	5,223,468	175,888—	3.03—
July 31, 1913....	5,399,356	407,965—	7.03—
June 30, 1913....	5,807,317	517,005—	8.18—
May 31, 1913....	6,324,322	654,440—	9.38—
Apr. 30, 1913....	6,978,762	490,194—	6.55—
Mar. 31, 1913....	7,468,956	187,758—	2.45—
Feb. 28, 1913....	7,656,714	170,654—	2.18—
Jan. 31, 1913....	7,827,368	104,796—	1.32—
Dec. 31, 1912....	7,932,164	79,281+	1.01+
Nov. 30, 1912....	7,852,883	258,502+	3.40+
Oct. 31, 1912....	7,594,381	1,042,874+	15.33+
Sep. 30, 1912....	6,551,507	388,132+	6.29+
Aug. 31, 1912....	6,163,375	206,296+	3.46+
July 31, 1912....	5,957,079	149,773+	2.58+
June 30, 1912....	5,807,346	56,363+	0.98+

Adopts C-H Magnetic Gear Shift.—The C-H magnetic gear shift which has been advertised by the Cutler-Hammer Mfg. Co., of Milwaukee, in *The Iron Trade Review* during the past six months, has now been adopted by another motor car manufacturer of Indianapolis. It is to be standard equipment on all new models which will be announced shortly. The C-H magnetic gear shift does away with the hand gear shift lever and allows gear shifting by means of push buttons. It permits of pre-selection of gear changes, prevents stripping of gears and eliminates the need for the hand lever.

Will Enlarge Plant

Camden, N. J., June 13.—Cramp Shipbuilding Co., Philadelphia, has purchased 45 acres on Petty's Island for enlargement of its present plant and for construction of big oil refinery for the Crew-Levick Co. The Pennsylvania Railroad Co. will build a span between the island and the New Jersey side to connect with New Jersey branches and to facilitate the transportation of shipbuilding supplies and export of oil.

Another Tool List!

Detroit Gas Turbine Corporation is in the Market

The Detroit Gas Turbine Corporation is in the market for the following equipment for immediate shipment:

Two No. 2 universal milling machines.
One No. 1 universal milling machine.
Four 22 x 30-inch gap lathes.
Four 18-inch lathes.
Six 14-inch lathes.
Five 12-inch lathes.
Four bench lathes.
One bath grinder.
Two 30-inch drill presses.
Four 20-inch drill presses.
Two arbor presses.
Three gang drill presses.
Two sensitive drill presses.
Three emery grinders.
Two automatic screw machines.
Two 36-inch Bullard turret mills.
One Lucas boring mill.
Two 16-inch tool room lathes.
One tool room grinder.
One 36-inch band saw.
Two wood turning lathes.
One wood planer.

Required:—

Milling cutters, end mills, drills, taps, dies, wrenches, hand tools, bench vises, files, tool steel, drill, chucks, reamers and an assortment of nuts, screws and bolts, and washers.

All lathes are to be furnished with one face-plate, one turning-plate and one 4-jaw independent chuck, in addition to other necessary tools and equipment. In addition four 6-inch universal, six 8-inch universal and four 10-inch universal chucks are to be supplied.

All machines are to be supplied with a suitable countershaft of latest design, together with main shafting, pulleys, belting, hangers, and driving motors with complete equipment.

Waldo H. Marshall, president of the American Locomotive Co., has been reelected first vice president of the Merchants' Association of New York.

Resolution Passed

By Association Pledging Members to Aid National Preparedness

During the convention of the American Drop Forge Association, which was held in Philadelphia, June 9, and which is more fully reported on page 1336 of this issue, the following resolution was adopted:

"Be it resolved that we, the members of the American Drop Forge Association, hold ourselves in constant readiness to serve this country with our trade knowledge, our equipment and our men for any necessary military defensive action that our government may require from us. We also declare that we are in favor of all unselfish efforts toward such military and industrial preparedness as will serve to provide an adequate safeguard against attack by an enemy."

Outside of the technical sessions, the time of the members was taken up entirely by the entertainment program, provided by the committee in charge of H. N. Taylor, N. & G. Taylor Co., Philadelphia. This included luncheons served by the National Machinery Co., Tiffin, O., and the American Shop Equipment Co., Chicago; a buffet supper served by N. & G. Taylor Co.; a theater party provided by the Heppenstall Forge & Knife Co., Pittsburgh; a baseball party arranged by the Chambersburg Engineering Co., Chambersburg, Pa.; automobile trips to Atlantic City, Valley Forge, Willow Grove and other points, and a number of features for the ladies.

Bar Inquiries Closed

New York, June 13.—All the authorizations which have been given to J. P. Morgan & Co. by European governments for the purchase of shell forgings for this year's delivery now have been satisfied, it is understood. Several of these matters were disposed of this week, but the tonnage and the distribution have not been learned. The closing of these matters does not mean necessarily that no further purchases of this kind will be made for this year's delivery, for new requirements may come up at any time. It does signify, however, that all the recent inquiries that have been pending, now are closed. J. P. Morgan & Co. still are carrying on negotiations for finished shells. The matters now in the market pertain chiefly to 8 and 9-inch shells, English specifications, and it is left to the manufacturers to stipulate the number and deliveries they can furnish.

Electrical Engineers to Meet

Plans have been completed for the thirty-third annual convention of the American Institute of Electrical Engineers, which will be held at the Hollenden Hotel, Cleveland, June 27-30. A large number of papers will be presented, including some of interest to the iron and steel industry. Wilfred Sykes and David Hall, Westinghouse Electric & Mfg. Co., Pittsburgh, will present a paper on "Electric Drive for Reversing Rolling Mills", which is expected to create considerable discussion. W. G. Taylor will read a paper entitled "Motor Equipment for the Recovery of Petroleum". F. W. Peek Jr. will present a paper on the "Effect of High Continuous Voltage on Air, Oil and Solid Insulation". An interesting series of entertainments has been provided, including a dinner-dance and reception at the Hollenden Tuesday evening, June 27, a theater party Wednesday evening, June 28, an excursion to Nela Park Thursday afternoon, June 29, and an all-day trip on the steamer CITY OF ERIE Friday, June 30.

Ten Million Dollar Coke Company

Pittsburgh, June 14. (By wire.)—The Pittsburgh By-Product Coke Co. has been incorporated in Delaware with a capital stock of $10,000,000 to operate plants for the manufacture of coke and other by-products from coal. The company is controled by the H. Koppers Co., Pittsburgh, and its stockholders The company will operate the Seaboard By-Product Coke Co., Jersey City, N. J., and the Minnesota By-Product Coke Co., St. Paul, Minn.

Lettings Show Gain

New York, June 14. (By wire.)—Structural lettings of the country in May gained about 12,000 tons in the total over April according to the figures of the Bridge Builders' and Structral Society announced today. The May figures were 137,000 tons compared with 125,000 in April, 175,000 in March 129,000 in February and 119,000 in January.

Selling at Higher Prices

Pittsburgh, June 14. (By wire.)—Announcement that leading makers have been quietly selling products for fourth quarter delivery at $4 a ton above the prevailing minimum prices lead to the belief that prices for third quarter delivery gradually have disappeared. All manufacturers have not opened their books for shipment in the fourth quarter of this year. Some of them are not in a position to promise deliveries to the latter part of 1916.

Large Lettings

New York, June 14. (By wire.)—The American Bridge Co. takes 5,000 tons for the new American Brass Co. plant at Kenosha, Wis., and the Canadian Bridge Co. the Toronto union station, estimated at 5,000 to 6,000 tons.

Emery W. Clark has resigned as a director of the General Motors Co. His is the third resignation of directors to take place since W. C. Durant recently came into the control of the company.

Ball Bearing Plant

The Norma Co. of America, New York City, is preparing to build what probably will be one of the largest ball bearing plants in the country. The company has purchased 10 acres at Elmhurst, L. I. The first unit to be erected on it will be 70 x 350 feet of reinforced concrete construction. The building will cost about $200,000 and the machinery and equipment a like sum.

Last of Year.—The Newark Foundrymen's Association, Newark, N. J., held its last meeting of the year on June 7. Following the usual dinner, the meeting was addressed by J. A. Shorey, General Electric Co., Schenectady, N. Y., who spoke on "Relation of Air Supply to Cupola Blowing". Mr. Shorey's talk was illustrated by lantern slides.

The Non-Ferrous Metals

Copper Lead Spelter Tin

THE dullness in the metal markets and the accompanying drop in prices have caused much comment in the trade. Buyers and sellers are expectantly awaiting developments. An interesting feature of the situation is the reactionary tendency in spelter, which has followed the brief buying movement of last week. The easing off in spelter is due to the anxiety of second hands to sell. These interests purchased large quantities of the metal last week, believing that the market was definitely headed upward, but their hopes have been dissipated. The producers, while fairly well sold up for the near future, seem pessimistic as a result of the downward turn in the market. The lack of future buying during the recent activity also was far from satisfactory to these interests, which had become accustomed to selling their output for many months in advance. However, it is pointed out that the brass mills are still holding off on their requirements and continued good demand may be expected from these interests so long as the war lasts.

The New York Market

New York, June 13.—All of the major metals, with the exception of aluminum, have undergone price declines during the week closing today. The most surprising development of this character was in spelter. The buying movement in this metal tapered off the latter part of last week and since then prices have declined ½c per pound. The present decline developed yesterday when second hands, who were among the heavy buyers last week, became frightened and sold at concessions. Prime western now is quoted as follows: Prompt and June, 13.25c, St. Louis; July, 12.75c; August, 12.25c; September, 11.75c; fourth quarter, 10.75c. Ordinary brass special spelter is quoted at 15c, St. Louis, for prompt shipment. Lower bids undoubtedly would find sellers.

Demand for copper has been dull and second hands, who remain in control of the market, have reduced their prices to attract buyers. Electrolytic now may be quoted as follows: Prompt and June, 27.75c to 28c, cash; July and August, 27.50c to 27.75c, cash; September and October, 27.25c to 27.50c, cash. Ordinary lake copper is quoted at 27.75c to 28c, cash for prompt shipment and ordinary casting copper at 25.50c to 25.75c, cash. First hands continue to quote electrolytic at 28.50c to 29c, delivered 30 days, for the last four months of the year.

The lead market is featureless and prices continue to sag off under the lead of second hands. The offers of these interests have established the outside market at 6.70c to 6.75c, St. Louis, and 6.80c to 6.85c, New York. Independent producers made sales today at 6.75c, St. Louis. Consumers are buying only immediate requirements. The American Smelting & Refining Co. continues to quote 7c, New York, and 6.92½c, St. Louis.

The antimony market was active yesterday for the first time in a long while and a good deal of spot business was transacted at around 21.50c, New York. No future business is offered owing to the uncertainty of the market.

The aluminum market continues strong due to the fact that all surplus production is being exported. Second hands are selling No. 1 virgin ingots at 60c to 62c for promut shipment and 58c to 60c for shipment over the remainder of the year. No. 1 remelted is quoted at 58c to 60c, for ordinary material, and No. 12 at 48c to 50c.

The tin market has been quiet, with only a fair amount of business each day as a rule. Prices have been declining gradually and spot now is quoted at 43.50c. Exsteamer prices are: June, 43.50c; July, 43c; August, 42c; September, 41c.

(*For complete prices see page* 1350.)

Difficulties of Rail Manufacture

THE VARIETY of sections rolled and the radical differences in specifications do much to hinder the railmaker—The use of a heavier section is predicted and a rail mill has been built to supply the increased demand for this commodity—The causes of rail failure and their solution are briefly discussed

BY J. S. UNGER

THE amount of money annually expended for steel rails in the United States during the past five years has averaged over $80,000,000. The rail industry ranks third in tonnage among the steel products. It constitutes about 12 per cent of all the steel rolled into finished material and is better known than almost any other steel product.

Owing to the severe demands made upon this commodity, a great deal of time has been given to investigation by both producers and users. Rail manufacturers have been engaged for years in making studies and investigations looking towards rail improvement, beginning with the manufacture of the steel and through all the subsequent operations to the finished product. In addition, they have thrown their shops open to representative engineers of railroad societies, who have made many investigations at almost every rail mill in the country. Such co-operative work must result in a better knowledge of the factors entering into rail manufacture. To be of the greatest service, such information must be supplemented by studies of the use and maintenance of the rail in actual service.

In studying the rail problem, one is impressed with the great number of sections in use today. Standards have been prepared and adopted by engineering societies, but they are used only by a few carriers, the larger systems having their own specications. In the same weight of rail, one finds the extremes from a thin, flat head, deep web, thin flange, to a round head, short web and thick flange. A decided economy could be effected by having fewer sections, as the cost of rolls and changes necessary to produce different sections are important items.

Another view of the effect of so many sections is presented in the case of a railroad operating cars on a flat-head rail. Since the wheels wear to fit the head, when these cars are hauled over another road with a round-head rail, the point of contact of wheel and rail is at the center of the head. On the other hand, if cars from the road using round-head rails be used on the flat-head rails, the wheel bears on each side of the head, concentrating the wear and stress at entirely different points.

An important consideration in the manufacture of rails is the variety of specifications. As a whole, they present few differences except that some carry more restrictions than others. It is to be regretted that the railroads cannot harmonize their specifications, which would result in a universal standard.

In all rails the primary consideration is safety, durability and cost. The severity of modern railroad service makes it necessary that every effort be made to insure safety as well as to produce more durable rails. Heavier rails are necessary to meet these severe conditions. The heavier rail is an improvement when it is not merely an added weight of five to 10 pounds per yard, which is one-third of that per foot, but a pronounced increase in size. Weight in rails, except as it affects cost, is not objectionable, as it is not a moving load. The impression exists that heavy rails lack ductility. This is true in a comparative sense only. A heavy rail cannot be distorted to the same extent as a light rail. A re-rolled 30-pound rail will stand more bending than a 100-pound rail from which it has been rolled, even though the finishing temperatures were the same. This is to be expected, as a similar condition exists when any article of steel is compared with one of heavier section made from the same steel. A piece of wire can be bent more than a 3-inch axle, although both may be made of the same steel. There is a growing tendency at the present time on some railroads to install heavier rails. One railroad has installed 135-pound sections on its fast passenger tracks, and another system has recently placed a large order for 130-pound rails. Some of the very heavy sections have not proved to be quite as satisfactory as was expected at the beginning of their use, but later experiments with some modifications have given satisfactory results. It would be idle to predict where this increase may end, but a 200-pound rail is a future probability. A new rail mill at the Edgar Thomson Works at Bessemer, Pa., was completed early in the present year. This mill is capable of rolling rails up to 150 pounds per yard and

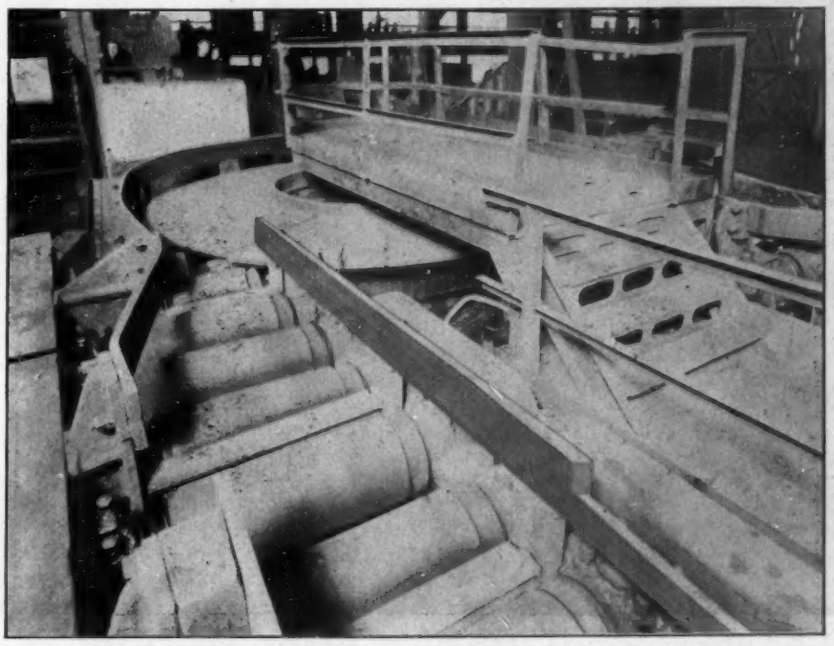


FIG. 1—TURN TABLE AND RETURN—48-INCH BLOOMING MILL

A paper presented at the spring meeting of the American Iron and Steel Institute, New York, May 26-27, 1916. The author, Dr. J. S. Unger, is manager, central research bureau, Carnegie Steel Co., Pittsburgh.

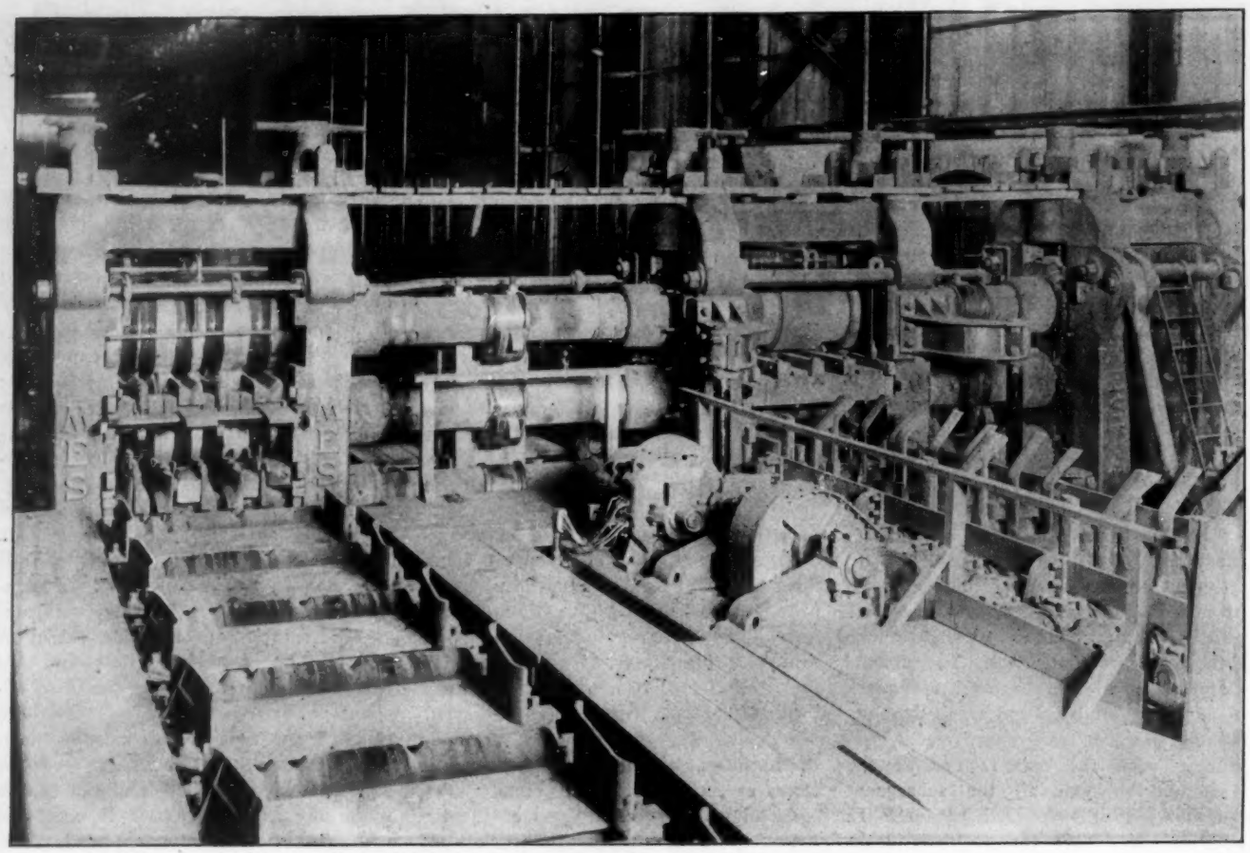


FIG. 2—FIRST AND SECOND SET OF ROUGHING ROLLS—RAIL MILL

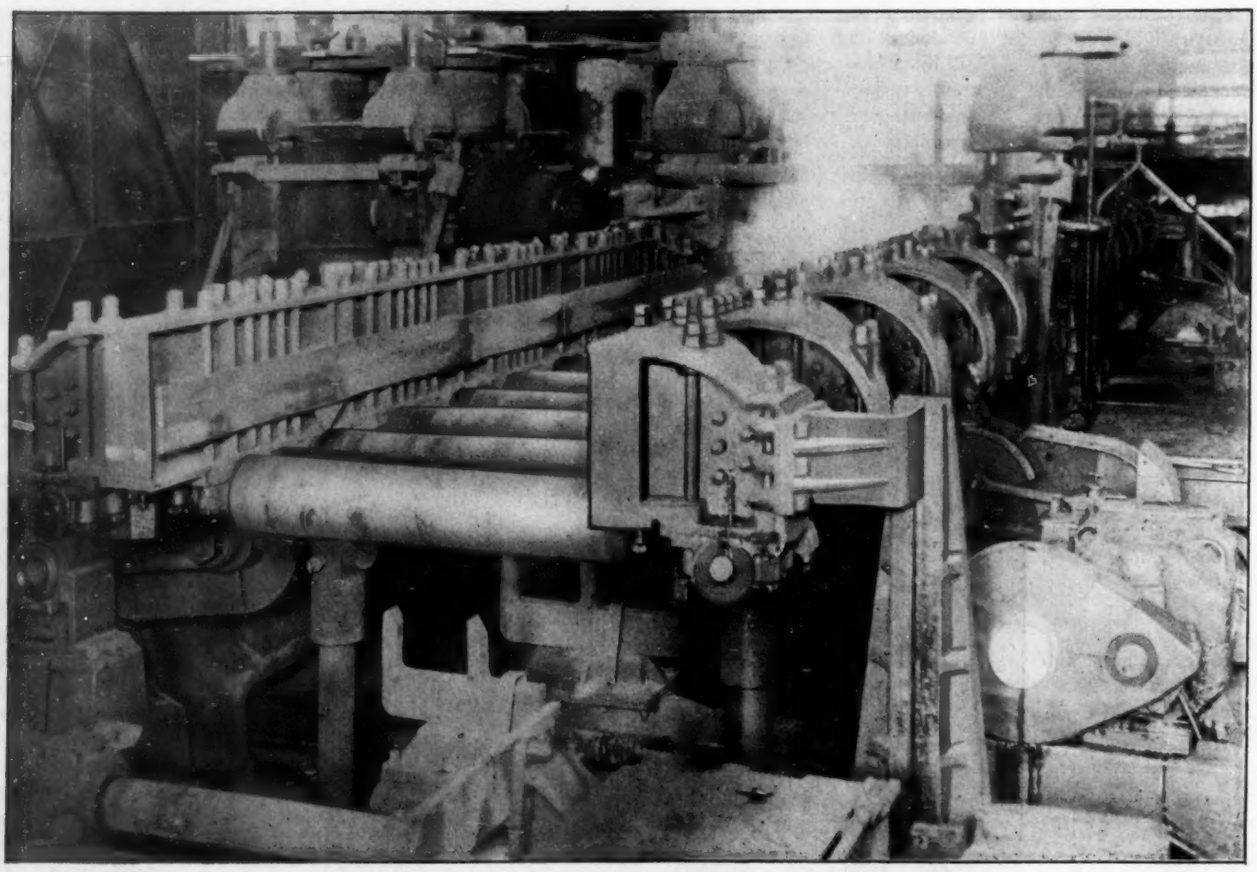


FIG. 3—THREE-HIGH REVERSING BLOOMING MILL TABLES

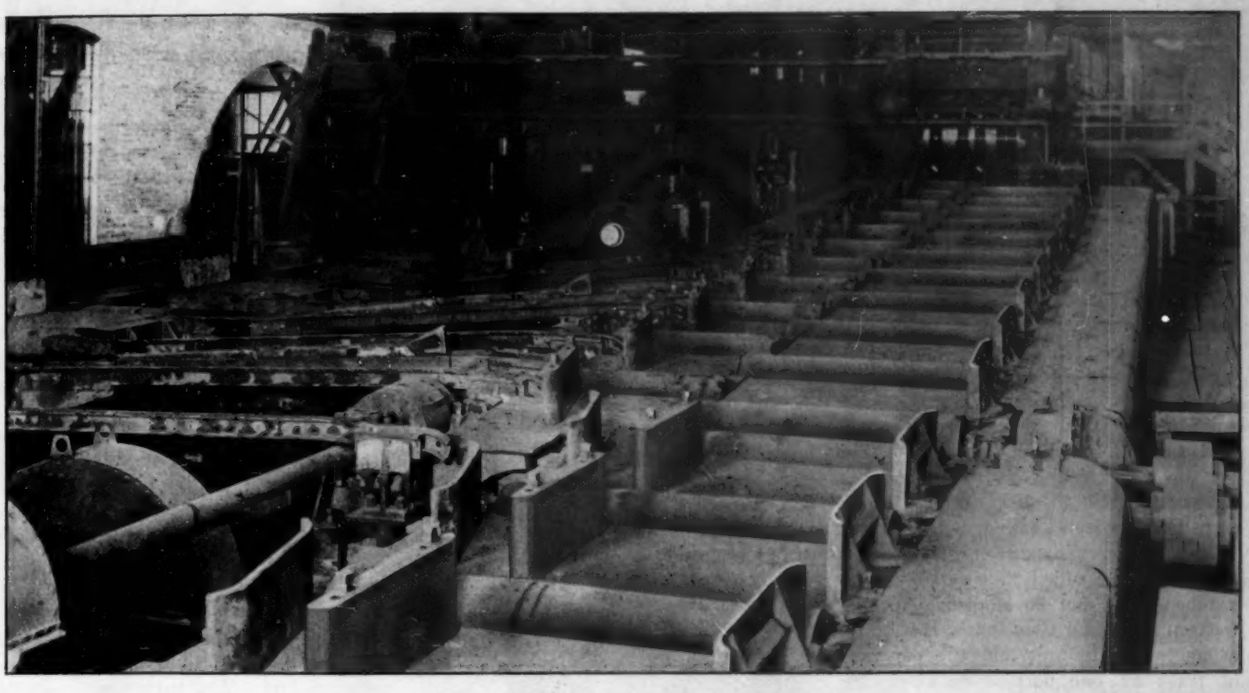


FIG. 4—TRANSFER TABLES IN THE RAIL MILL

will be able to supply any demand for heavier rails for some time.

In looking towards possible rail betterment, the Edgar Thomson plant is using an ingot 23½ inches square, instead of the smaller ingot used by many of the older mills. This ingot is bloomed at the beginning in a tandem 2-high, non-reversing 48-inch mill with two passes in each stand. The ingot first goes through a pass in the first stand, then is turned 90 degrees and given a pass in the second stand. It is then returned to the first stand by a turn table and carrier, again turned 90 degrees, given another pass, turned again and given a last pass in the second stand, thus rolling the ingot on all sides, turning at every pass before being sent to the three-high 40-inch reversing blooming mill, which completes the blooming. The bloom is then sheared, reheated and rolled on the rail mill.

The advantages of preliminary blooming lie in the large fillets used in the rolls, avoiding any tearing at the corners of the ingots, the very slow rolling speed employed, giving a kneading action to the plastic surface of the ingot, and the rolling on all sides, working all surfaces of the metal equally. This mill has been rolling 130-pound rails for some time. To give an idea of the quality of these heavy rails, not a single rail has failed in any of the mechanical tests made at this works to date. Other features of this mill are noteworthy, among them being the commodious underground passages to the mill machinery and to the soaking pits. This facilitates making changes in the mill equipment when it is necessary. The investigations of the rail manufacturer have not only covered the manufacture of rails, but also some of the causes of rail failures. I do not believe a rail-testing machine can be built which will exactly imitate service conditions. The vibration and loading might be imitated, but to imitate the speed at which they are applied would be difficult, if not impossible. In studying rail failures, a study should be made of some of the causes which may assist in producing them. Bad gaging of track, worn wheel tread and flanges, flat spots on wheels, poor trucks, poor subgrade, insufficient ballast, improper counterbalance on engine, bad ties and insufficient area of contact between wheel and rail should be considered. Rail maintenance and the condition of rolling stock exercise an important influence. Rails rarely break on trestles, crane runways or bridges. When failures occur at these points, they are due to crushing or split heads, which are noticeable and

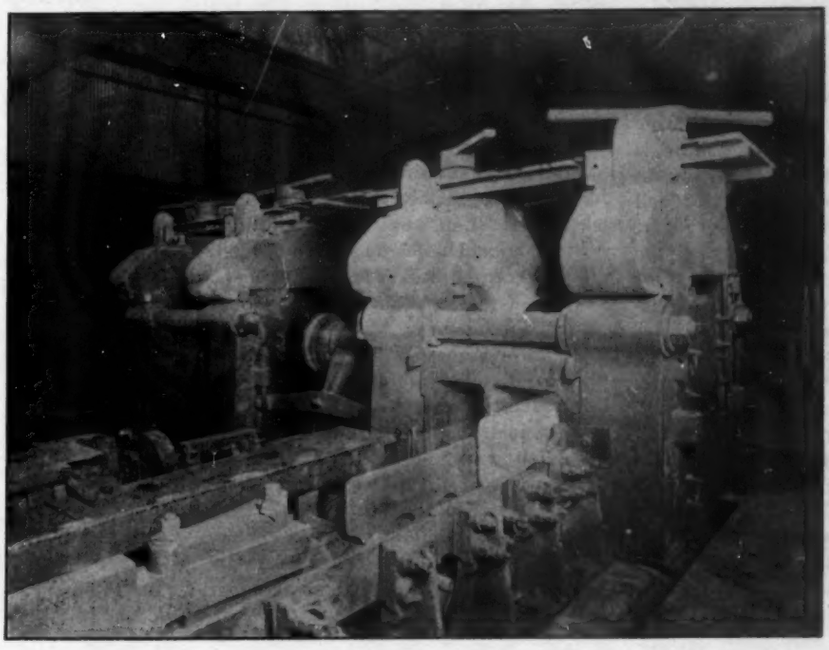


FIG. 5—THE 48-INCH TWO-HIGH REVERSING BLOOMING MILL

can be removed before an accident occurs. In an accident, a broken rail may show better quality than the adjoining or opposite rails which did not break. The question might be asked here: When is a rail a good rail? Rail failures are few when compared with the number of rails used annually, and would not be considered serious in most of the ordinary articles made of steel. Rail failures are greatly dependent on climate and locality. A railroad official of a road in the northwest claimed he could examine his monthly record of broken wheels and rails and determine the date at what point on the road they had extremely cold weather. This statement is borne out in drop testing rails at temperatures from 50 to 100 degrees below zero, Fahr., which showed a pronounced falling off in resistance to shock. In these tests, the added effects of a frozen roadbed could not be studied. Another western road had two and a half times as many rail failures annually per mile of track on one portion in which the sub-grade was largely clay, as compared with another portion of track on a sandy, porous sub-grade, the traffic and rail section being the same in each case. An official of this road stated, "These facts seem to confirm the statement 'there are indications that rail failures are a question of geography!'" An experiment under my supervision verifies this statement, when I found a piece of track about 500 feet long in which rails, splices and fastenings failed much more rapidly than in the track on either side. The track was perfectly straight, the fill for sub-grade of the same material, the rails, ties and ballast alike. No apparent reason could be found for the difference in performance, until it was pointed out that the railroad crossed an old, abandoned canal bed, where the ground had remained soft and swampy for years.

Transverse fissures appear as a new rail disease. Apparently composition is not responsible for their occurrence, as they are found in both segregated and unsegregated rails and from every part of the ingot. Lack of ductility of the steel cannot be charged against it, as of 102 rails removed for transverse fissures, more than one-half had an elongation of over 10 per cent, while one of the rails giving only seven months' service, had 14 per cent elongation. From incomplete investigations made, transverse fissures appear to be a kind of detailed fracture, the result of a combination of cold rolling or working of the metal in service and vibration of the rail. The results so far indicate they may be produced on a new or worn rail at any point desired. If this can be proven, the answer is obvious. A rail must be so strong, or so well supported that it cannot vibrate. I have made many inquiries, but have not heard of a case of a transverse fissure on a well supported rail, as on a bridge. Some engineers go so far as to recommend that a rail be laid on a longitudinal girder to support it.

Rail durability can be obtained by several methods. Alloy steels, of which manganese steel is a good example, is one method, but its cost, except for special locations, as yards, switches, terminals or congested traffic points, is prohibitive. Heat treated rails of alloy or carbon steels have shown less wear in the few service tests made to date, and are another example of possible improvement in rail durability. Rail improvement will be made. This result will probably be reached by using the best steel obtainable, an increase in size of section and the best possible maintenance. A combination of these factors should lead to a settlement of the rail question.

PORTABLE METER FOR MAKING HARDNESS TESTS

Portable Meter for Making Hardness Tests

An ingenious device, widely extending the application of the Brinell method for determining the hardness of metals and known as the Brinell meter, recently has been designed and placed on the market. Already it has been adopted in a number of large steel works, foundries, automobile plants and other metal working establishments.

This instrument aims to overcome disadvantages which have attended the making of Brinell tests in a plant. These disadvantages include the impossibility of applying the test to any given spot of a large mass of metal such as rails, heavy castings, etc., or to irregularly shaped pieces or hollow metal bodies; the difficulty of making the tests on thin metal sheets of any kind because under pressure the ball penetrates the section; and finally, the fact that the apparatus could not be handled conveniently.

With the Brinell meter, these restrictions are said to be removed and the field of application greatly broadened. The instrument consists of a housing with a movable 10-millimeter ball projecting, and a detachable standard bar of carefully determined Brinell hardness which is inserted in the housing. The smooth surface of this bar contacts with the ball. Thus when pressure is applied, a spherically shaped impression is made in both the bar and in the metal under test. The diameters of the two indentations are measured by special scales. The hardness, which is in direct relation to the proportion of the two impressions, is determined from direct-reading tables which are supplied with the instrument. The pressure may be varied without affecting the accuracy of the tests since the method used is a comparative one. The meter also can be used as a hardness gage on steel purchased according to a certain specification.

The outfit consists of the housing, six standard bars, 12 standard steel balls, measuring scales, and direct-reading tables, all packed in a 9 x 6-inch leather carrying case. The outfit weighs only 6½ pounds. The meter was designed and patented by the metallurgical department of the Standard Roller Bearing Co. and is manufactured under a license agreement by Herman A. Holz, 50 Church street, New York City.

Installs New Mill

The St. Louis Screw Co., St. Louis, is installing a 20-inch puddle mill, built by the Lewis Foundry & Machine Co., Pittsburgh. The mill is two-stand three-high and will be driven by a 600-horsepower Allis-Chalmers motor, operating at 300 revolutions per minute, with Morse silent chain connection to the mill. The latter will operate at 60 revolutions per minute. The chain consists of two strands, 18 inches wide, 2-inch pitch, 102-inch centers. The squeezer is geared to the mill train drive. The drive also is being furnished by the Allis-Chalmers Mfg. Co., Milwaukee. Powdered coal will be used in firing the furnaces. The mill will probably be in operation about Sept. 1.

Smith Gas Power Co., Lexington, O., has installed a three-unit sectional Smith gas producer in the plant of the Halcomb Steel Co., Syracuse, N. Y.

Determining Grain Size in Metals

THE SIZE of grains in metals is in some cases an excellent indication of their properties. Especially is this true of metals which have been annealed or heat treated. The authors of this paper have evolved a new method for ascertaining the number of grains in given samples which is believed accurate

BY ZAY JEFFRIES, A. H. KLINE AND E. B. ZIMMER

IT IS well known that many properties of metals vary with the size of grain or cell. For most industrial purposes, where a high ultimate strength and a high elastic limit are desired, the manufacturer tries to produce a fine grained structure. For some purposes, as in transformer iron, a coarse grained structure is desirable. The terms "fine grained" and "coarse grained" are used only in a relative sense. For example, fine grained cast copper might have grains 100 times larger than coarse grained high speed steel. Similarly, a fine grained steel rail might have grains or cells 100 times larger than coarse grained wire made of steel from the same heat. In some metals, the change in grain size is more appreciable than the changes in any of the properties determined by the tensile test. Furthermore, in metals which have been annealed or subjected to high temperatures, grain size may prove a better indication of the life of the metal in use than the tensile test. One of the authors was able to supplant the tensile test with grain size determinations in the control of metal for a specific use, the latter determination being more indicative of the life of the metal than the tensile test. A grain size determination with a tensile test is, of course, more valuable than either test singly.

At present a decided dearth of data exists as to actual grain size determinations in metals, there being consequently a corresponding lack of ability to interpret the determinations after they are made. It would be desirable to have correlation made between grain size and properties of metals, comparing thousands of determinations. In this way, grain size determinations might be interpreted in much the same manner that a tensile test is now utilized.

One of the chief reasons that more grain size measurements have not been made is the excessive work involved in making a determination. The planimeter method is accurate—in fact, too accurate, for the nature of the work involved—but it is slow and tedious. It involves the tracing of the outside boundary lines of a group of grains, counting the grains, measuring the area with a planimeter and a calculation which is different for each determination. Furthermore, the method requires a planimeter, which piece of apparatus might not be available in all metallographic laboratories.

The authors have developed a method by means of which a grain size determination can be made in one-fifth the time required by the planimeter method. The method is as accurate as the sampling of the specimen and requires no apparatus which is not available in metallographic laboratories.

The planimeter method may be used in either of two ways. The image of the metal specimen may be projected on a piece of paper and the grain boundaries traced, as shown in Fig. 1. The total area divided by the number of grains inclosed, will give the average area per grain. The second method, which involves less time, is to trace on the paper just the outside lines bounding the area of a group of whole grains. The number of included grains is then indicated by check marks on the paper, as shown in Fig 2. Since the counting of the grains can be done at the time of checking, this way is the shorter. The following example is taken from an actual determination: The area which was determined by measuring with a planimeter was 5.92 square inches. The number of grains inclosed was 61. Therefore, the average area per grain was $\frac{5.92}{61} = 0.09705$ square inches. The observation was made at a magnification of 100 diameters. Then $\frac{0.09705}{100 \times 100} =$ 0.000009705 square inches, which was the actual area per grain. $\frac{1}{0.000009705} =$ 103,040 grains per square inch.

The Heyn method depends for its accuracy on the assumption that the intercepts of a straight line intersecting a number of grains will be proportional to the square roots of the areas of the grains. In other words, the square of the average intercept will be the average area per grain. Heyn applies this assumption as shown in Fig. 3. The number of grains is counted along a line, such as *AB*. The first incomplete grain is counted as one, and the last grain is not counted. By taking a number of lines parallel to *AB* and counting the grains intersected by each, the average intercept in one direction is obtained. The average

Table I

Heyn's Method of Counting Metal Grains

Measurements in direction *AB*			Measurements in direction *CD*			Area of grain.		Number of grains per square inch.		
Total l'gth.	Total grains.	Average diameter.	Total l'gth.	Total grains.	Average diameter.	Heyn's method.	Planimeter method.	Heyn's method.	Planimeter method.	Error, per cent.
55.0	177	0.311	57.0	210	0.272	0.0845	0.0885	10.91	10.67	2.25
55.0	192	0.288	57.0	200	0.285	0.0820	0.0815	12.20	12.25	0.41
55.0	210	0.262	55.0	189	0.291	0.0761	0.0818	13.20	12.23	7.90
57.5	171	0.338	57.5	172	0.334	0.1130	0.1320	8.89	7.60	17.00
40.0	104	0.374	40.0	102	0.392	0.0151	0.1540	6.62	6.50	1.84
47.5	189	0.251	47.5	184	0.258	0.0650	0.0743	15.40	13.50	14.10
37.5	147	0.255	35.0	144	0.242	0.0630	0.0660	15.90	15.20	4.60
40.0	187	0.214	40.0	157	0.255	0.0512	0.0586	19.20	17.10	12.25
32.5	116	0.280	32.5	125	0.260	0.0730	0.0730	13.70	13.70	0.00
32.5	120	0.271	35.0	130	0.270	0.0700	0.0960	14.30	10.40	37.50
37.5	101	0.371	40.0	102	0.392	0.1455	0.1895	6.90	5.30	30.10
32.5	93	0.349	30.0	80	0.375	0.1310	0.1720	7.62	5.81	0.69
42.5	98	0.434	42.5	108	0.394	0.1710	0.1795	5.85	5.60	4.47
27.5	82	0.386	30.0	90	0.333	0.1120	0.1200	8.91	8.33	6.96
37.5	104	0.361	37.5	99	0.380	0.1360	0.1510	7.36	6.62	11.20
30.0	89	0.337	30.0	100	0.300	0.1010	0.1290	9.90	7.77	27.50
32.5	95	0.342	30.0	95	0.316	0.1080	0.1360	9.29	7.36	26.10
25.0	67	0.374	27.5	75	0.367	0.1370	0.1730	7.31	6.10	19.90
20.0	51	0.392	20.0	50	0.400	0.1570	0.1950	6.38	5.12	24.50
24.0	123	0.195	22.0	118	0.186	0.0365	0.0374	27.50	26.80	2.61
26.0	151	0.172	24.0	144	0.167	0.0287	0.0319	34.90	31.40	11.20
Average percentage of error.....										13.00

A paper presented at the February, 1916, meeting of the American Institute of Mining Engineers, New York City. The experiments from which the data accompanying the article were derived, were made in the metallurgical laboratory of Case School of Applied Science, Cleveland.

intercept in the direction *CD*, at right angles to *AB*, is obtained in a similar way. The product of the two average intercepts is the average area per grain. For example, suppose the number of intercepts in the direction AB is 79 and the distance 20 inches. The average intercept is $\frac{20}{79} = 0.2533$ inches. Likewise, suppose the number of intercepts counted in the direction *CD* is 72 and the distance is 16 inches. The average intercept in this direction is $\frac{16}{72} = 0.222$ inch. Then the average area per grain is $0.222 \times 0.2533 = 0.05623$ square inch. If the magnification is 100 diameters, then $\frac{0.05623}{100 \times 100} = 0.000005623$ square inch, actual area per grain, or $\frac{1}{0.000005623}$ grains per square inch.

It is not necessary to trace the grain boundaries to apply Heyn's method. A piece of cross-section paper may be used for a screen and the grains intersecting each line counted and the distance measured.

The intercept method is based on the same assumption as Heyn's method, but the readings are not confined to series of parallel lines. The method of procedure for determining the grain size by the intercept method is as follows: In Fig. 4, the line *AB* is drawn through the center of the field This line intersects 13 grains in a length of 2.58 inches. The average intercept per grain is therefore $\frac{2.58}{13} =$ 0.198 inch (0.198) = 0.0392 square inch, the average area per grain. If we consider the magnification as 100 diameters, then $\frac{0.0392}{100 \times 100} = 0.00000392$ square inch, the actual area per grain. The number of grains per square inch is $\frac{1}{0.00000392} = 255{,}000$. In order to get the average diameter per grain, sufficient lines should be taken to intersect from 50 to 500 grains.

In actual practice, this method is shortened considerably. An eye-piece with a graduated scale may be used in place of the regular eye-piece. The length of an even number of grains can be measured direct and the approximate grain size obtained in a short time.

The method used by the authors has for its object the quick determination of the equivalent number of whole grains included within a circular portion of an image. It is evident that some of the grains will be completely included within the circle, and that some will be intersected by the circumference of the circle. The former will have no correction factor.

The boundary grains, however, will be partly inside and partly outside the circle. In Fig. 5, the grains marked with a check mark are completely inclosed and those marked + are the boundary grains. The average portion of each boundary grain included within the circle may be found as follows: The grains completely included within the circle are first counted and checked. Then, the boundary grains are checked with a different mark and counted. (If the counting is done at the time of checking, the time of making a determination will be shortened.) In Fig. 5, there are 37 included grains and 22 boundary grains.

The area of the included grain by planimeter is 1.9 square inches. The area of the circle, whose diameter is 1.83 inches is 2.635 square inches 1.9:2.635 = 37:X. X = 51.3, the equivalent number of whole grains within the circle.

51.3 — 37 = 14.3, the equivalent number of those grains in the inside portions of the 22 boundary grains. $\frac{14.3}{22} = 0.65$ average portion of each boundary grain within the circle.

If this factor be determined on a large number of samples, it may be used on unknown samples to find the equivalent number of whole grains within a circular area. If we call this factor *y* the total number of grains within a circle is $z + yw$, where z is the number of grains completely enclosed and w is the number of boundary grains. The factor *y* has been determined empirically on 175 samples. The results are given as shown in the following table, the first column representing the number of grains completely included within the circle:

Grains completely included.	Average value of y	Number of determinations.
10-20	0.556	11
20-30	0.582	15
30-40	0.542	13
40-50	0.574	10
50-60	0.590	11
60-70	0.600	12
80-90	0.577	11
70-80	0.576	10
90-100	0.596	10
100-120	0.551	11
120-140	0.618	11
140-160	0.546	10
160-180	0.566	10
180-200	0.558	11
200-230	0.606	10
230-290	0.622	9

The average value of the factor *y*, for 175 determinations, is 0.581. The

Table II

Intercept Method of Calculating Grains in Metal

Total length of line, inches.	Total number of grains cut.	Average diameter of grain.	Area of grain.	Area of grain by planimeter.	Planimeter method, grains per square inch.	Intercept method, grains per square inch.	Error, per cent.
16.70	87	0.1920	0.0369	0.0425	23.5	27.1	15.3
20.75	121	0.2275	0.0540	0.0353	28.4	19.5	31.3
17.80	98	0.1820	0.0330	0.0380	26.4	30.4	15.2
19.63	105	0.1780	0.0317	0.0412	24.3	31.5	28.9
18.50	107	0.1725	0.0297	0.0352	28.4	33.6	18.2
20.20	112	0.1810	0.0325	0.0357	28.0	30.8	10.0
20.45	115	0.1780	0.0317	0.0387	25.9	31.5	21.5
17.60	99	0.1780	0.0317	0.0438	22.9	31.5	37.5
20.30	119	0.1703	0.0291	0.0334	30.0	34.4	14.8
31.40	114	0.2760	0.0763	0.0875	11.4	13.1	14.9
34.70	135	0.2570	0.0660	0.0815	12.3	15.1	23.2
30.50	144	0.2120	0.0450	0.0529	19.0	22.2	17.1
32.52	120	0.2720	0.0740	0.0773	12.8	13.6	4.6
32.06	139	0.2310	0.0531	0.0810	12.4	18.8	51.5
33.58	135	0.2490	0.0620	0.0641	15.6	16.2	3.82
33.88	139	0.2450	0.0596	0.0682	14.6	16.2	15.0
33.88	138	0.2460	0.0605	0.0885	11.3	16.5	50.2
Average percentage of error.....							21.9

Table III

Authors' Method of Counting Grains in Metal

Included grains.	Boundary grains.	Factor.	Area of circle.	Authors' method, grains per square inch.	Planimeter method, grains per square inch.	Error, per cent.
118	49	0.6	7.068	147.4	146.30	0.8
95	35	0.6	7.068	116.0	123.80	6.3
34	27	0.6	7.068	50.2	49.85	0.7
59	30	0.6	7.068	77.0	76.22	1.0
74	37	0.6	7.068	96.2	94.93	1.3
56	35	0.6	7.068	77.0	73.69	4.5
110	41	0.6	7.068	134.6	137.80	2.3
93	40	0.6	7.068	117.0	116.97	0.0
75	37	0.6	7.068	97.2	94.20	3.2
103	43	0.6	7.068	128.8	134.00	3.9
Average percentage of error.....						2.4

same factor can be used for all numbers of grains included within the observed area, but it is recommended that all important determinations have

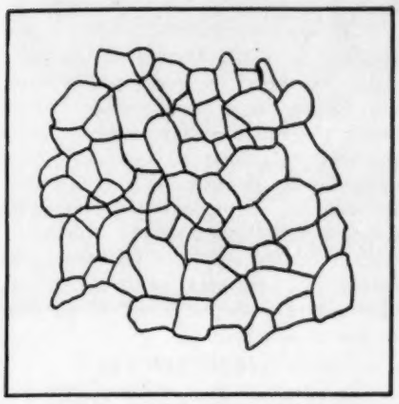


FIG. 1—PLANIMETER METHOD

at least 50 grains included within the circle. Since 0.581 is nearer to 0.6 than to 0.5, we have adopted 0.6 as a general factor for all determinations. It should be noted that an error of 1 per cent in the determination of the whole-grained equivalent of the boundary grains makes an error of less than 0.25 per cent in the final result, since more than 75 per cent of the total area of the circle is occupied by the included grains. The following is an example of how the factor is used:

Inclosed grains	66.0
Boundary grains	28.0
Factor	0.6

$66 + 0.6 \times 28 = 82.8$ grains within the circle.

From the magnification the number of grains per unit of area can be readily calculated.

In making the calculations for the comparison of methods, the actual number of grains per unit of area was not figured, the number of grains

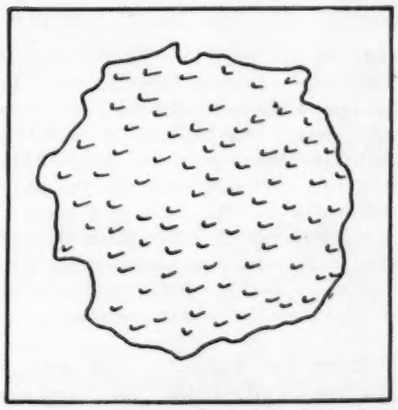


FIG. 2—PLANIMETER METHOD, MODIFIED

per square inch on the drawing being sufficient for comparison. The percentage of error was figured in the following manner: Suppose the planimeter method gave 50 grains per square inch, the intercept method 54.2 and Heyn's method 55.6. The percentage of error in the intercept method is $\frac{4.2}{50} \times 100 = 8.4$ per cent; and in Heyn's method $\frac{5.6}{50} \times 100 = 11.2$ per cent. Tables I, II and III show the comparative results obtained by the use of the different methods.

In Heyn's method and the intercept method, the results are persistently high. In the former, all of the errors are plus except one, and that is only minus 0.41 per cent. In the intercept method, only one minus error is found. In the authors' method, the average of plus and minus errors is minus 0.1 per cent, which, of course, is less than the accuracy of the determinations. A way to make a grain-size

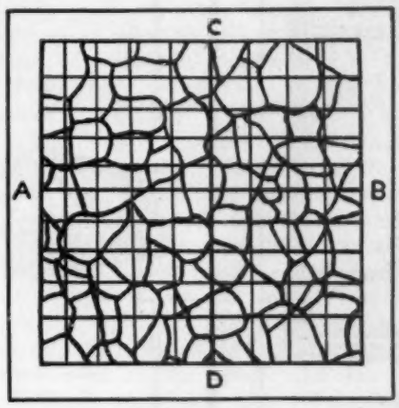


FIG. 3—HEYN METHOD

determination by the authors' method has been developed. A circle 79.8 millimeters in diameter is used. In the third column is given the factor, for each magnification, by which the equivalent number of whole grains within the circle is to be multiplied to obtain the number of grains per square millimeter. The table is as follows:

Magnification used.	Diameter of circle, millimeters.	Factor.
25	79.8	1/4
50	79.8	1/2
100	79.8	2.000
150	79.8	4.500
200	79.8	80.000
250	79.8	12.500
500	79.8	5.000
750	79.8	112.500
1,000	79.8	2.000
1,500	79.8	4.500
2,000	79.8	8.000

The following example shows how this table is used: Included grains, 61; boundary grains, 35; magnification, 100. Grains per square millimeter $= (61 + 0.6 \times 35)2 = 164$. Similar tables can be made for square-inch calculations, or for circles of different diameters. The results cited indicate that the intercept method and Heyn's method are not ac-

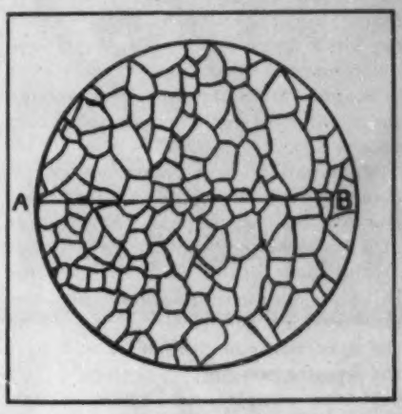


FIG. 4—INTERCEPT METHOD

curate. The largest error found in 187 determinations by the authors' method was 6.4 per cent, the average error 2.1 per cent, and the average algebraic deviation from the planimeter measurements, plus 0.25 per cent. An average of 30 representative determinations showed that 78.5 per cent of the total area of the circle was occupied by the included grains. This portion is determined accurately by the authors' method. The factor is used in determining only 21.5 per cent of the number of grains. An error of 5 per cent in estimating the boundary-grain portion makes an error of slightly over 1 per cent in the final result. A square or any other shape might be used, instead of a circle. It seems probable, if a square or rectangle were used, that the factor would be 0.5 instead of 0.6, when the circle is used.

Some metallographic specimens have more than 5,000,000 grains ex-

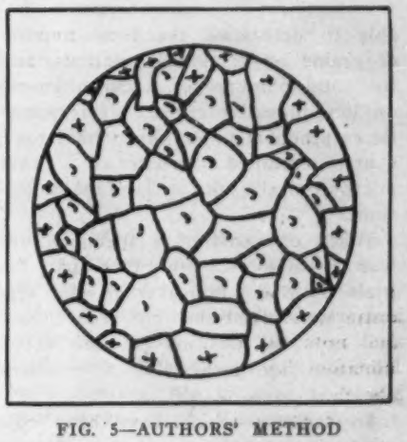


FIG. 5—AUTHORS' METHOD

posed on one face. It becomes necessary to obtain a representative sample of this face. The authors have tentatively adopted these general

rules, which, of course, can be changed as occasion demands:

Use such a magnification that about 50 grains will be included within the circle. It is better to have more than 50 grains included within the circle than less, but it is always recommended that an even number of magnifications be used, even though the number of included grains should exceed 100.

Make at least five determinations at about equal intervals along the diameter of the specimen. The average of all of the determinations is taken as the final result. It is evident that if there is much difference in grain size between the edge and center of the specimen, the former should have the greater weight.

If the samples are small enough, for example, small wire, it is advisable to determine the total number of grains on transverse sections, and the total number for a given length on longitudinal sections. It is sometimes practical to do this with larger, coarse grained specimens, either microscopically or at low magnifications.

When one part of a specimen differs greatly from another part in grain size, do not average the separate determinations, but record each and note the position of each determination by means of a freehand sketch.

In samples which have been cold worked, the relative degree of cold work in any direction is expressed by the ratio of the length divided by the width of the grains. For obtaining this ratio, it is recommended that Heyn's method be used.

Automatic Device for Cleaning Castings

The shaking-out problem has always been a serious one in foundries, particularly in shops turning out a large number of relatively small castings, such as brakeshoes. An automatic device calculated to eliminate the greater part of the manual labor ordinarily expended in breaking up molds and freeing the castings from sand has been patented by Carl A. Peterson, Chicago, and assigned to the American Brake Shoe & Foundry Co., Mahwah, N. J.

As shown in the accompanying illustrations, this device consists essentially of a conical tumbling barrel fitted with lattice bars through which the sand passes while the castings are being rattled. The tumbler is set with its main axis inclined about 30 degrees from the horizontal. The flasks are shaken-out at the upper end and after a suitable interval, the cleaned castings, freed from sand, are discharged from the lower end on to a truck running on a narrow-gage industrial track.

This device is designed for use primarily in continuous foundries where the molds are transferred from the pouring to the shaking-out stations on industrial tracks or other suitable conveyors. As shown in the elevation, Fig. 1, a jib crane fitted with a simple trolley is used for shifting the castings from the mold conveyor to the cleaning device and shaking-out the flasks. The flasks are picked up by a hand-controled toggle mechanism, which is shown clearly in Fig. 1, and as soon as they are in a suitable position, the sand and castings are knocked out into the tumbling barrel by means of a pneumatically-operated plunger. The plunger cylinder is carried at the lower end of the jib crane trolley.

The tumbling barrel is driven by an electric motor through a sprocket chain, as shown in Fig. 2. The sand drops into an enclosed space underneath the tumbler from which it is removed by a suitable conveyor. This device was designed to supplement the cleaning arrangement described in *The Foundry*, January, 1914; the latter consisted of a series of inclined baffle plates and gratings over which the casting slid from the level of one floor to that of another.

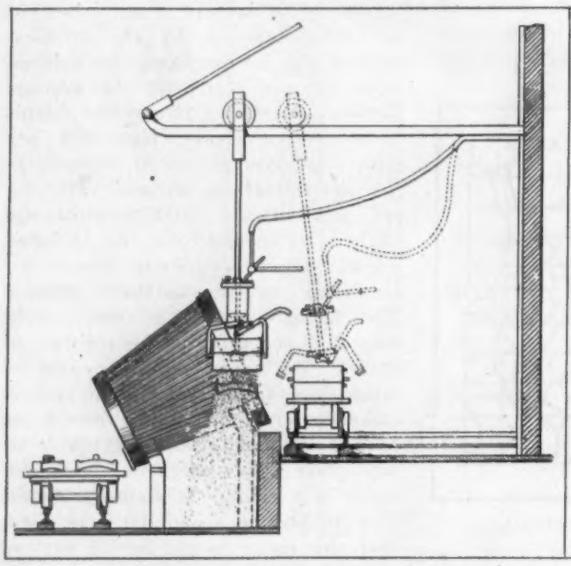


FIG. 1—ELEVATION OF AUTOMATIC BRAKE SHOE CLEANING DEVICE, SHOWING METHOD OF SHAKING-OUT MOLDS AND HANDLING CASTINGS IN TUMBLING BARREL

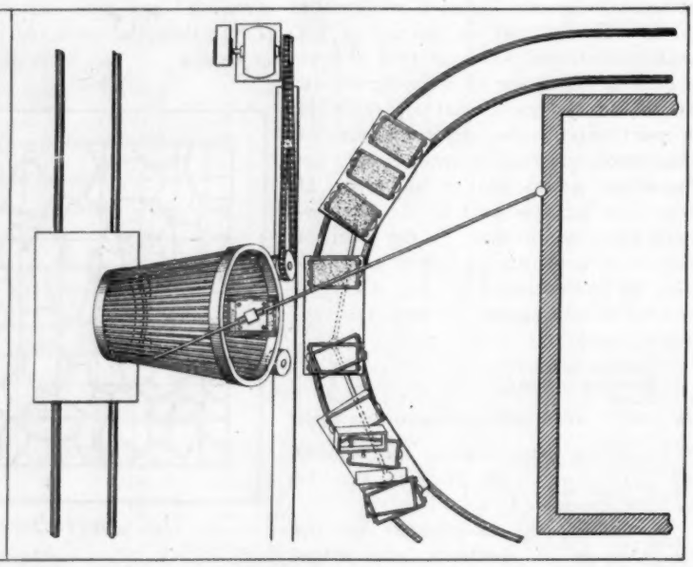


FIG. 2—PLAN OF AUTOMATIC CASTING CLEANING DEVICE SHOWING MOTOR CONNECTIONS AND ARRANGEMENT OF MOLD CONVEYOR

The Pennsylvania railroad has ordered 120,000 tons of 130-pound steel rails for its lines east of Pittsburgh. This new section is identical with the 125-pound section adopted two years ago, except that ⅛-inch of metal is added to the top of the head. The new rail, therefore, will use the same fastenings as the 125-pound section. The Bessemer & Lake Erie railroad also has ordered a considerable portion of its 1916 rail requirements rolled to this new 130-pound section.

Sherritt & Stoer Co., 603 Finance building, Philadelphia, has been appointed exclusive sales agent of the Gardner Machine Co., Beloit, Wis., for the Philadelphia district. The Sherritt company will carry a stock of Gardner disc grinders for metal and wood work, together with ball-bearing polishing machines and other Gardner products.

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

Various Statistics

I would highly appreciate it if you would be kind enough to answer the following questions:

1—*What was the production of pig iron and steel in* 1914 *and* 1915?

2—*How many tons of iron and steel products were exported in* 1915?

3—*How many tons of steel rails were manufactured in* 1915?

4—*How many furnaces were in blast at the end of the year* 1915?

5—*What was the number of railroad cars ordered in* 1915?

1—The production of pig iron in 1914 was 23,332,244 tons and in 1915, 29,916,213 tons. The production of steel ingots in 1914 was 23,513,030 tons, and in 1915, perhaps 31,500,000 tons approximately. The official statistics of ingot production for 1915 have not been announced as yet.

2—The iron and steel products exported in 1915 were approximately 3,530,000 tons, according to government reports.

3—The production of steel rails in 1915 was approximately 2,204,203 tons.

4—The number of blast furnaces in operation on Jan. 1, 1916, was 295.

5—The number of railroad cars ordered of builders in the United States during 1915, was approximately 110,000.

Elkhorn Coal Field

What is the Elkhorn coal field, where is it located, and to what extent has it been developed?

The Elkhorn coal field is a tract consisting of about 350,000 acres, located in southeastern Kentucky, in Pike, Letcher, Knott and Floyd counties, principally in Pike and Letcher counties. It lies north of the North Fork of the Kentucky river, and west of the Big Sandy river, and southwest of Pikeville, Ky. The principal cities in this district are Jenkins, and McRoberts, Ky. These fields were .open in 1910 by the Consolidated Coal Co., which purchased 100,000 acres of ground at a cost of $10,000,000. This company began operations in 1912 and today is the largest operator in that district, controling about 200,000 acres upon which are located 27 mines with an annual output of 4,000,000 tons of coal. Other smaller operators produce between 1,000,000 and 2,000,000 tons of coal annually.

This district is reached by the Louisville & Nashville, Chesapeake & Ohio, and Baltimore & Ohio railroads. The vein in the Elkhorn field has a maximum thickness of about 1,500 feet, and the coal produced is used principally in the gas plants and for the manufacture of furnace coke. The coal has a calorific value of 14,400 British thermal units to the pound, and has a yield of 64.73 per cent coke. One ton will produce from 10,500 to 11,000 cubic feet of high calorific value gas, 14 gallons of tar, 5 pounds of NH_3, and yields coke with a calorific value of 13,750 British thermal units. Following is a chemical analysis of Elkhorn coal:

Moisture	1.75
Volatile matter	34.52
Fixed carbon	60.77
Ash	2.96
	100.00
Sulphur	.59
British thermal units dry	14,648

This coal field is being developed very rapidly and at present is one of the largest and most important in the United States.

About 180,000 tons of coke are produced in the Elkhorn district each year. The coke ovens are located between the Big Sandy river and the main line of the C. & O. railroad, and the district operated by the Consolidated Coal Co. The companies operating coke ovens are as follows: Allegheny Coke Co., Elkhorn Consolidated Coal & Coke Co., and the Marrowbone Coke Co.

Prices of Sheets and Shapes

Will you please advise us as to the prices on shapes and No. 28 galvanized sheets, f. o. b. Pittsburgh, on the following dates: October, 1913; *April,* 1914; *December,* 1914; *April,* 1915; *October,* 1915; *January,* 1916; *April,* 1916?

The prices of shapes and No. 28 galvanized sheets on the dates named were as follows:

	Shapes.	No. 28 galvanized sheets.
October, 1913	1.37c	3.07c
April, 1914	1.18	2.92
December, 1914	1.05	2.80
April, 1915	1.15	3.30
October, 1915	1.41	3.50
January, 1916	1.865	4.75
April, 1916	2.50	4.89

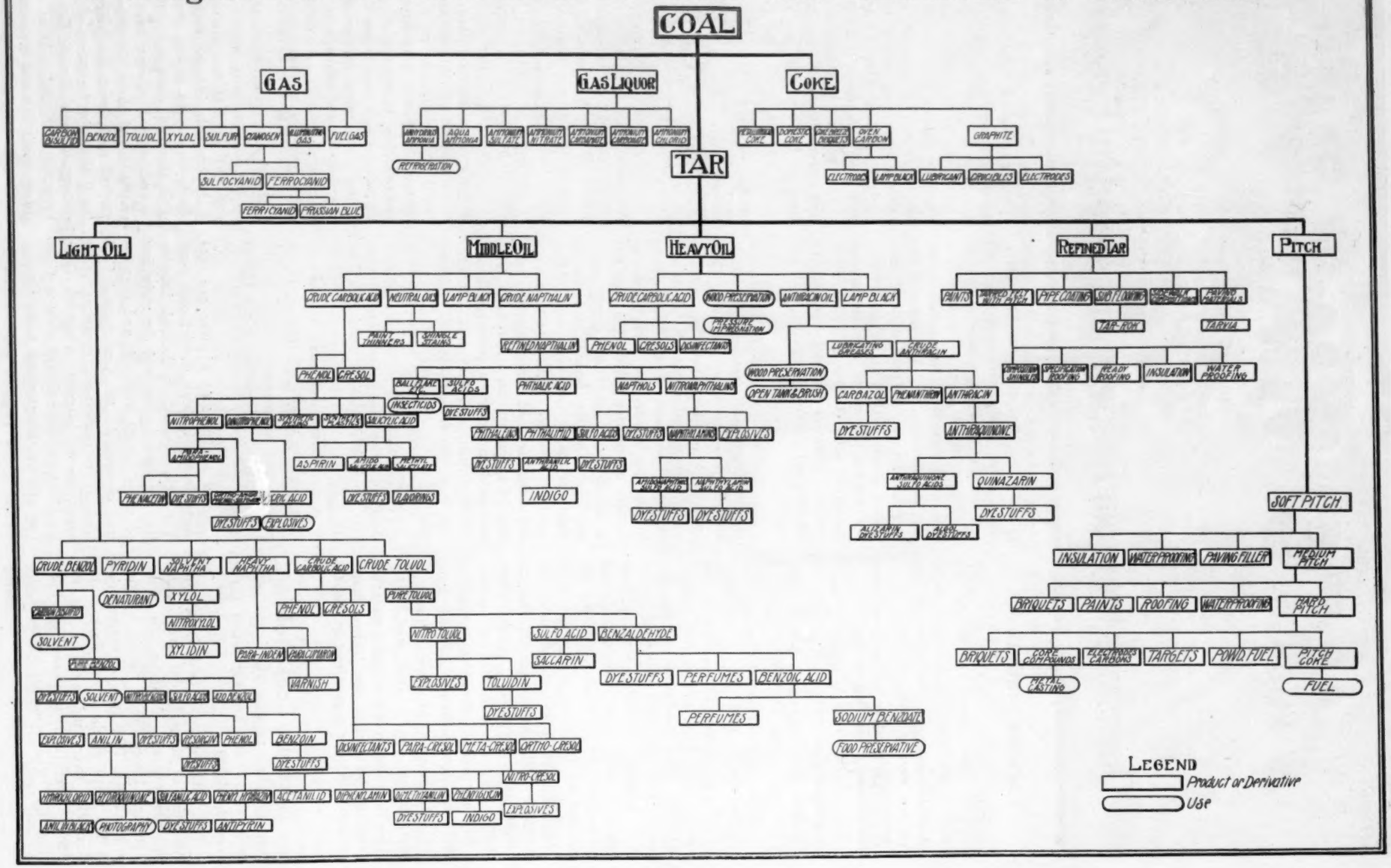
As you know, conditions this year have been extraordinary and there has been and still is a wide range of prices on leading products. In the case of shapes, for example, the price which we give you, 2.50c, Pittsburgh, is the price at which we believe the largest percentage of tonnage is going, because it is the price made by the Steel Corporation, but when this price is named, the delivery is delayed for a number of months. If you must have immediate delivery, considerably higher prices are asked. In all these cases, we follow the policy of quoting the price at which the bulk of the tonnage is sold.

Selling by Discounts

Were steel sheet products ever sold on the discount basis, similar to methods employed by pipe and shafting makers?

Our records indicate that galvanized sheets were sold on the discount basis until about 16 years ago; other grades, we understand, always have been sold on the pound basis. Discounts for galvanized steel sheets disappeared at about the time of the formation of the Corporation, although discount lists were used by some mills and a great many consumers until 1904 and even later.

Diagram of Products Derived From Coal and Some of Their Uses



The By-Products of Coke Making—III

THE LAST installment of an analysis of the by-product coke oven industry. The author deals with the manufacture of coal tar as a by-product. He shows that the development of by-product plants is increasing the production of tar faster than demand for it can be created. New uses must be found for pitch

BY WILLIAM HAMLIN CHILDS

THERE are about 50 distilling plants located in the United States. Many are naturally in the large cities, where the greatest demand exists for the road surfacing materials, paving pitch and roofing, that constitute the largest items of tonnage. Another reason for having tar-distilling plants located in large cities is the exacting service required in the delivery of road tars and paving pitch, in which hundreds of motor-driven tank trucks are engaged. Hence, freights from gas or coke oven works are often 25 to 40 per cent of the value of the tar at shipping point.

The transportation, handling through plant, dehydration and mechanical features of tar distilling would require a separate paper. Over 1,200 tank cars are now engaged in the transportation of tar and tar products, and on the Atlantic coast are about 20 barges of 25,000 to 300,000 gallons capacity. At one of the larger plants are 50 storage tanks of 1,000 to 20,000 barrels capacity.

There are few if any proper uses for crude tar, both by reason of its varying character and because the presence of water and ammonia is objectionable in practically all cases. However, crude tar can be successfully burned in the same manner as heavy petroleum distillates and residues. At this point it may be well to say that tar itself as well as any of the crude fractions obtained from it, can replace petroleum fuel oils in steam plants, metallurgical furnaces, etc., whenever the relative value of the products makes burning a good economic policy. Tar oils have been successfully used in engines of the diesel type in this country and abroad. In Germany tar oils are apparently the preferred fuel for these engines. Coke-oven tars average about 16,500 B. T. U. value, and the heavy distillates 17,000.

How Tar is Distilled

The first step in tar distillation is dehydration, and this is one of the most expensive and troublesome. Dehydration may be accomplished in the tar still, but more approved practice favors heating in thin films under partial vacuum. Special apparatus for continuous dehydration is now in use at several works.

The tar stills in general use are of the horizontal type. European practice favors the vertical type still, and it is used to some extent in the United States. Continuous distillation has been tried in Europe and in this country with varying degrees of success, but encouraging results are lately being obtained in this direction. Further development in designing apparatus for distillation will engage the attention of the engineers in this industry as in the larger field of petroleum distillation, where new apparatus and processes are being patented almost daily.

The horizontal still is of cylindrical form, set in brick, and usually has a protecting arch under the still bottom. Gaseous, liquid or solid fuel can be readily adapted for firing. Steam or air agitation is generally used, and sometimes vacuum may be employed to advantage.

The vapors are condensed in a long worm, usually arranged as a rectangular coil in an open tank. Means for heating the condensing water must be provided. The condensate is collected in small tanks, which provide means for observation and measurement of the oils. From these the several fractions are discharged into receiving tanks, and thence pumped to storage.

In running to pitch, three to five fractions are taken, depending on the requirements for the pitch and on the desired uses of the oils. These fractions include light oil or crude naphtha, carbolic or middle oil, heavy or creosote oil, anthracene oil, and residue, namely, distilled tar or pitch.

Delivered at the New York meeting of the American Iron and Steel Institute, May 26-27, 1916. The author, William Hamlin Childs, is president of the Barrett Co., New York.

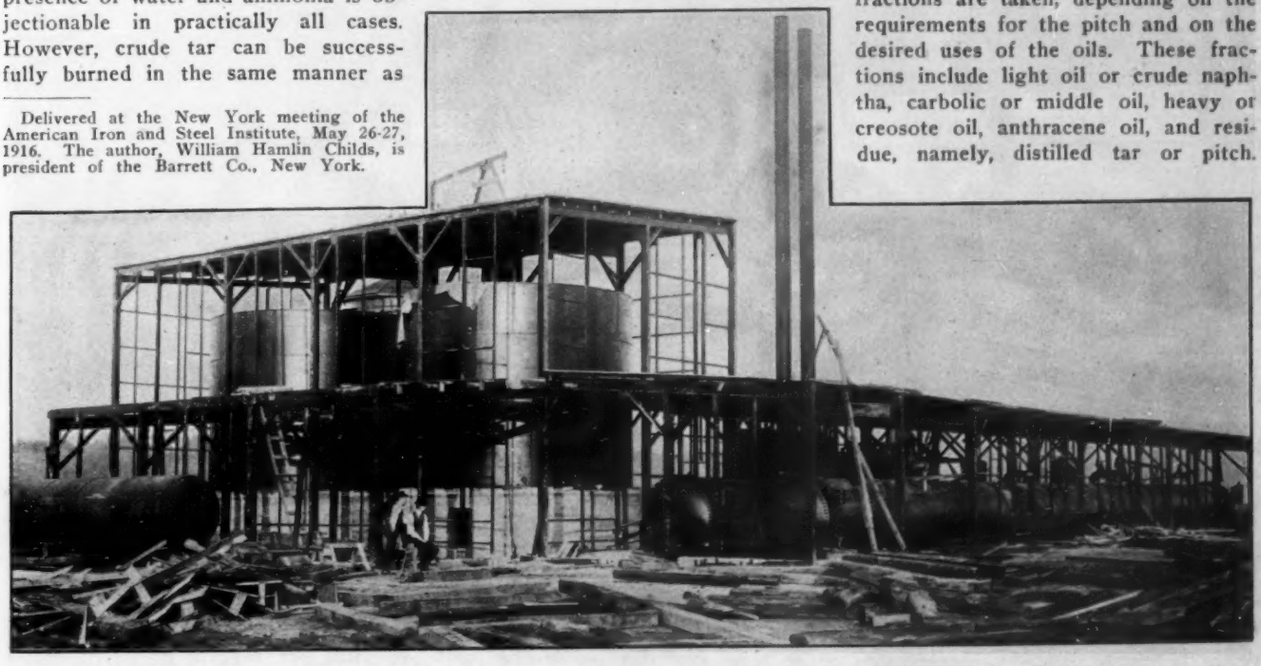


FIG. 4—A PLANT WHERE TIMBER IS CREOSOTED. THE WOOD IS PLACED IN THE HORIZONTAL CYLINDERS AND SUBJECTED TO THE CREOSOTE MIXTURE UNDER PRESSURE

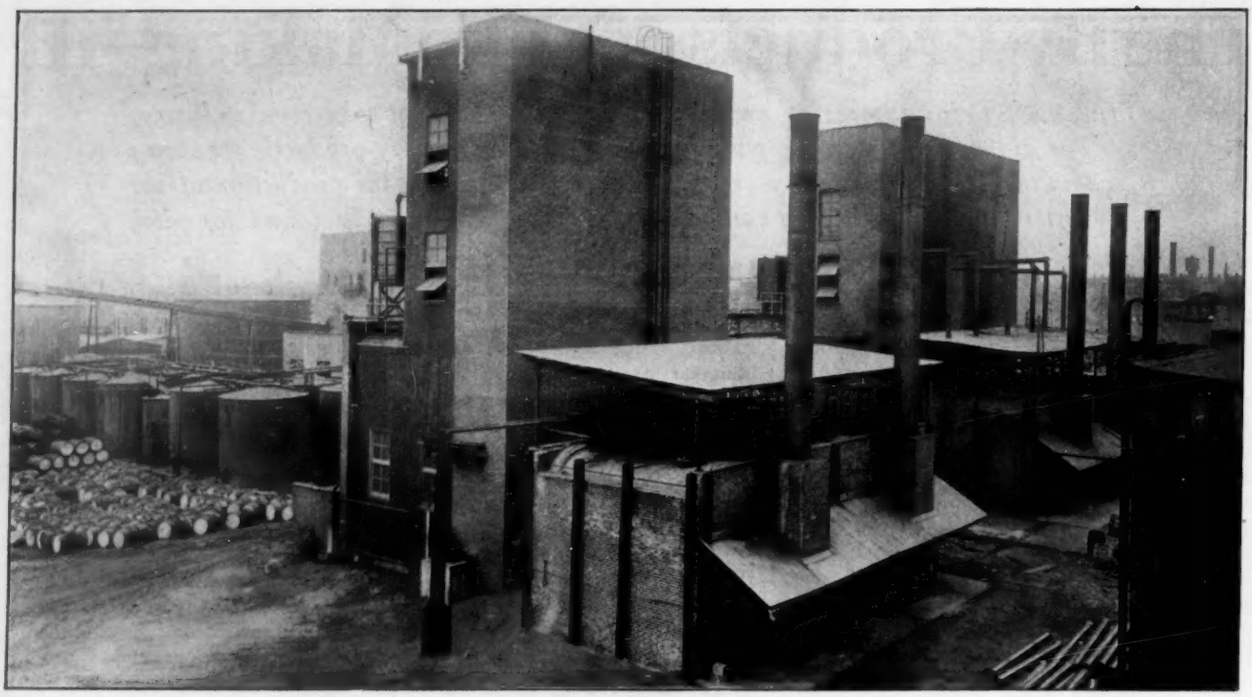


FIG 5.—STILLS IN WHICH THE LIGHT OIL OBTAINED FROM THE TAR IS TREATED

Light oil comprises the entire distillate lighter than water, up to a vapor temperature of about 400 degrees Fahr., and from it, by redistilling and washing the products, benzol and toluol may sometimes be obtained in small amounts. Solvent naphtha and heavy naphtha, and small amounts of phenol and cresols, are derived from light oil. This light oil fraction varies from less than 1 per cent to 3 or 4 per cent. Coke-oven tars are usually very deficient in light oil compared with gas-works tars.

Carbolic or middle oil varies from 5 to 15 per cent, being usually cut at such a point as will include most of the tar acids and naphthalene. The oil is cooled to remove naphthalene and may be sold as a crude disinfectant, or the tar acids may be extracted by treatment with caustic soda and liberated by sulphuric acid or carbon dioxide. From the crude tar acids, phenol and cresols can be isolated. The phenol or carbolic acid content of tar seldom exceeds 0.25 per cent. Naphthalene, which can be recovered from this fraction and the succeeding one, may amount to 5 to 7 per cent.

Certain fractions of the middle oil have lately found use in ore concentration by the flotation process. This is a new and comparatively unexplored field from the oil producers' standpoint, though almost every type

FIG. 6—DIGGING OUT FINISHED LUMP NAPHTHALENE

of mineral and vegetable oil is being experimented with. The tar oils that have so far met with most favor are liquid fractions of comparatively high tar acid content.

Creosote oil often comprises the fraction distilling from the middle oil to the end of the distillation. It is sometimes cooled for removal of naphthalene. It contains some cresols, which may be removed by means similar to those employed in treating middle oils. This fraction is taken largely for wood preservation and has to be run so as to meet the varying requirements of that industry.

Wood Preservation Creates Demand for Creosote Oils

The creosote oil fraction, depending on the hardness of pitch made, varies from 14 to 30 per cent of tar. Without the use of creosote oil for wood preservation, it is doubtful if the industry of tar distilling could have been successful. The amount of oil used for treating timber annually has increased from 50,000,000 gallons in 1908 to 100,000,000 gallons. Of this, nearly two-thirds has been imported from Europe; but for three or four years past, the relative consumption of domestic creosote has been increasing. About 80 per cent of the creosote oil used in treating timber goes to preserve railroad crossties. Only 30 per cent of the ties used per year are treated, although the economic value of treated ties is acknowledged. Piling takes about 5 per cent, paving blocks 5 per cent and construction timber 7 per cent of the oil used. Obviously, this field is capable of great development. The importation of creosote oil from Europe and the conservative estimate placed by engineers on increased life of timber when treated, tend to prevent the price of creosote from exceeding a pretty well defined figure. Some of the requirements of the wood-preserving industry are often very exacting as to the tests that the oil has to meet, and tars have to be carefully studied by the distiller in order to produce creosote oils that meet the requirements of the consumers.

Anthracene oil yields anthracene, which after purifying becomes the source of alizarin, an important product in dyestuff manufacture. Pure anthracene may amount to 0.2 per cent of tar. In the past there has not been any demand for anthracene in the United States, except for a brief period 20 years ago, when some crude anthracene was exported. The production of anthracene for domestic alizarin manufacture is now practically assured. Unless a separate heavy fraction is desired, creosote and anthracene oils are often taken as one.

The residue left in the still varies from a viscous, semi-solid material to pitch hard enough for grinding, depending on the amount of oil distilled off. The point for stopping distillation is often determined by the consistency of pitch desired. Pitch comprises from 50 to 80 per cent of the tar, depending on the character of tar and the hardness of the pitch.

FIG. 7—STORAGE TANKS FOR CRUDE TAR

Its uses are varied. Long experience in some fields and scientific research in others has determined what physical and chemical properties are desirable in pitches for each important use. In order to produce pitch meeting these requirements, the tar distiller has especially to study, select and combine tars of different quality.

American Distillers Lead

It is in the development of soft and medium pitches that the American tar distiller has far surpassed the achievements of his European contemporaries. We have extended the use of pitch into much wider fields, and in addition to that we have devoted infinitely more care to the production of pitches meeting the special requirements of each purpose. Large sums of money have been expended, not only on advertising such uses for pitch as the specification roof and road tar, but on the technical development of these products, and on educating the architects and engineers upon whose decision the choice of materials depends. It was frankly admitted by the delegates from England, France and Germany at the international road congress in London, 1913, that in technical work on the use of bituminous materials in road construction, American chemists and engineers were far in the lead.

Mention of the uses of distilled tars must include saturant for roofing felts, coatings for iron and steel pipes, surface treatment of roads by hot or cold application. The soft pitches are used as a filler in block pavements and for

Table IV

Analyses of Tars

Tests	Coke Oven Tars			Gas Works Tars			
	No. 1 Type A	No. 2 Type B	No. 3 Type C	No. 4 Horizontal (Old)	No. 5 Horizontal (New)	No. 6 Inclined Retort	No. 7 Vertical Retort
Specific gravity at 60° F.	1.178	1.173	1.187	1.254	1.218	1.198	1.154
Water, per cent.....	1.0	1.3	2.3	2.8	5.2	3.3	3.6
Free carbon (insoluble in benzol) per cent by w'ght	7.6	4.3	10.4	29.8	21.6	19.9	3.7
Viscosity, Engler at 212° F., 100 cc. (seconds)..	76	30	37	273	103	89	30
Light oil (to 400° F.) per cent (crude benzol, toluol, solvents, etc.)	5.3	1.8	1.4	2.0	3.3	4.1	3.7
Middle and creosote oil (to soft pitch), per cent	20.8	35.0	24.0	18.7	21.1	22.1	30.2
Soft pitch (including loss), per cent....	73.9	63.2	74.6	79.3	75.6	73.8	61.2
Tar acids (phenols, cresols, etc.), per cent in tar...	5.0	1.1	0.34	1.6	2.9	5.2	7.2

waterproofing walls below grade. Medium pitches are used in roofing, saturating fibrous materials, and as binder in briquetting fuel. Harder pitches go into the manufacture of electric carbons, sealing and insulating compounds, core compounds, foundry facings and clay pigeons.

Pitch for most of the foregoing purposes has to be run within very closely controled limits of consistency, usually specified by a melting point test, which has come to be widely used.

Creating a Market for Pitch

The tremendous increase in the output of coal tar from new and enlarged by-product coke-oven plants has made it imperative to find new uses for pitch. One rather promising outlet for very hard pitch is as pulverized fuel, where, in some cases, for metallurgical work, it can compete advantageously with fuel oil. Hard pitch normally contains less than ½ to 1 per cent ash and only about 1/3 to ½ of 1 per cent sulphur. For these reasons it can be used where pulverized coal would be out of the question on account of much higher ash and sulphur content. Work on another pitch outlet was started by our engineers nearly a year and a half ago, in the line of mixing with coke breeze or noncoking coals to supply the cementing properties necessary for satisfactory coking. It is very interesting to note, by frequent references in the English gas journals within the past few months, that the surplus of pitch in England has caused experiments there to be made along this line.

It is significant that an editorial in a recent issue of the *Gas World,* London, in which this problem was discussed, was entitled "The Burden of Pitch." This, then, sums up the tar problem: 8 to 10 per cent of relatively high-priced refined products, of which our growing synthetic chemical industries will absorb a proportion yet to be determined, and which we will market in competition with European products; 25 to 30 per cent of heavy oils for which a ready market exists, with definite price limits; and 50 to 70 per cent of the burden of pitch.

Conclusions

The by-product coke-oven industry is entering a period of rapid development and the by-product industries must expand to keep pace with it. This expansion must take place on lines adapted to our own conditions and to the large volume of materials involved. We may learn from foreign experience, but we must not be content to copy their methods. The great outlet for ammonia is in agriculture, in which direction there seems ample room for development, though it may come slowly and need fostering. The future field for gas is in an increased use for general city and industrial service, made possible by more widely extended distribution systems and by replacement of natural gas shortages, also in generating power by means of gas engines.

There is ample benzol, toluol and homologues now recovered for our present domestic consumption of solvents, chemical derivatives and explosives. After the present abnormal conditions are past, the surplus will find ready use as motor fuel.

New uses for tar must be found for an increased production of 100 per cent within two or three years, unless it is to be used as fuel. Refined derivatives, including phenol, cresols, naphthalene and intermediates, will be produced in sufficient amount to meet the demands of the color, drug and chemical manufacturers. The degree of development in this direction depends on the action of the government with regard to protective measures and upon the co-operative effort of the industries involved.

The increased amount of creosote oil will tend to keep the price at such a level that European producers will seek to find outlets at home for their surplus. The outlook for pitch is exceedingly problematical. Although new uses may be confidently looked for, it seems inevitable that a large proportion of pitch must find its outlet in the fuel field.

The by-product coke-oven, besides being an integral part of our steel industries, is our main source of benzol, toluol and phenol for munitions and the wide range of chemicals of scarcely less importance. It is also our only operating native source of combined nitrogen for nitric acid, and the only possible one outside of the costly processes for fixing atmospheric nitrogen. This fact should be recognized by the government and co-operation for national defense should be established.

Book Reviews

Ford Methods and the Ford Shops, by Horace Lucien Arnold and Fay Leone Faurote; 440 7 x 10-inch pages; cloth; published by the Engineering Magazine Co., and furnished by *The Iron Trade Review* for $5.00 net.

This book is an exposition of the extraordinary methods used by the Ford management in developing the remarkable system which has set new records for output. It is doubtful if any author has given a more accurate or a more intimate account of the working details of a great manufacturing plant than have Mr. Arnold and Mr. Faurote in the chapters on arrangement and equipment of departments, the construction and development of special machinery, the subdivision of machining and assembling operations and the special supervision of routing, inspection, and chassis assembling. A phase of the subject, most valuable to the works manager who is looking for more economical production, is the account of methods employed by Ford in reducing the time of various operations. The detailed information which takes in the smallest problems of machine shop and foundry is given with a frankness characteristic of the Ford policy and is indicative of the spirit of co-operation which must have existed between Mr. Ford and the authors. To the manufacturer, manager or engineer who is confronted with the problem of mechanical production, the book will prove of great value, not only for the exactness of the information furnished, but for the insight given into the personality of the remarkable man who has accomplished such unusual results in modern industrial practice.

English and American Tool Builders, by Joseph Wickham Roe, assistant professor of machine design, Sheffield Scientific School, Yale University; published by the Yale University Press, New Haven, Conn., and furnished by *The Iron Trade Review* for $3.

The title of this book clearly indicates the field that it covers. An explanatory note by the author states that his purpose is to bring out the importance of the work and influence of the great tool builders. The art which they developed is fundamental to all modern industrial arts, yet little is known by the general public relative to the great tool builders, while their lives and work are even less a matter of general knowledge. The creative work in tool building has been done largely by American and English builders, the French having always shown an aptitude for refinements, the Swiss for personal skill, while the principal machine tools had taken shape before the German empire was founded. The lives and work of both early and modern tool builders are discussed in a comprehensive manner, including such men as Wilkinson, Bramah, Bentham, Brunel, Maudslay, Whitney and North, together with many now living who have promoted the growth of the machine tool industry in New England, along the Atlantic coast and in the central western states. In tracing the lives of these men, one naturally gains a clearer impression of the development and refinement of machine tools from their earliest forms to modern types.

This book covers a field which has not been entered since Samuel Smiles' *Industrial Biography* was published more than 50 years ago.

Handling the Blast Furnace Charge

THE AUTHOR in this, the third and last installment, discusses the use of various devices for insuring better distribution of raw materials below the large bell—The economic importance of better blast furnace practice is translated into tons of iron ore and coke with results that prove to be astonishing

BY GEORGE W. VREELAND

THE almost universal use of the large bell, without distributors of any kind, has standardized its dimensions for furnaces of various stock lines and those using lake ores. After a careful examination of a large number of furnaces, it was found that the diameter of the bell is generally 4 feet less than the diameter of the furnace stock line, although there are a few cases where this difference in diameter is somewhat less, but the above seems to be the accepted figure on large furnaces with 15 to 17-foot stock lines.

The angle of the bell in many cases has been increased from 45 degrees, the standard for many years, to as high as 53 degrees. The entire surface is now machined. This has been done in order that the wet and sticky ores will clear the bell and spread in a uniform stratum over its entire circumference. If the ore leaves the bell in an uneven stream after the lowering of the bell is started, it will cause the bell to swing, and the materials still to leave the bell will disturb the distribution and the lay of the raw materials in the furnace.

Killeen Distributing Ring

The Killeen stationary distributor consists of a tapered cast steel ring, about 6 feet 6 inches long and 11 feet to 11 feet 6 inches in diameter at the smaller or lower end. The large bell is reduced to about 9 feet 6 inches in diameter. These dimensions apply to furnaces with a top 16 to 17 feet in diameter. The material leaves the large bell, strikes the distributor and is deposited in a ring, as illustrated in Fig. 9. This gives a ring with the maximum fines, the apex of which is about 3 feet away from the wall, the coarser materials rolling to the center and wall.

The idea in designing this distributing ring was to throw the coarser materials closer to the walls, permitting an easier passage of the gases, and thereby obtaining cleaner walls. During the time of the lower percentage of Mesabi and higher percentage of coarser ores, this ring produced results that compared very favorably with those obtained on furnaces using the large bell and no ring. As the lake ores increased in fines, however, furnaces equipped with the Killeen

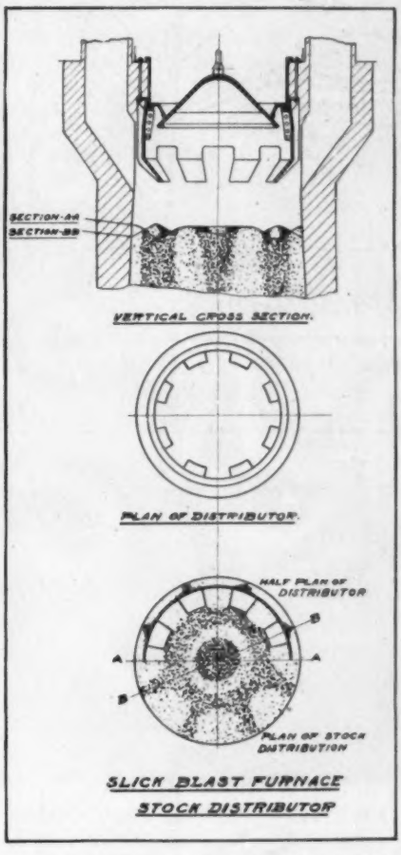


FIG. 8—SLICK DISTRIBUTING RING

distributor experienced more and more trouble with high pressures and irregular movement of the stock with resultant high coke and low tonnages. It was readily seen that though our walls were kept comparatively clean we were unable to force the air and gases through the heavy mass of iron-bearing material so far away from the tuyeres. The physical conditions of the ores finally reached that point where it was almost impossible to keep the furnace moving and it was necessary to go to the large bell.

Below is a comparative statement showing the results obtained on a furnace with a Killeen distributor ring and the same furnace without the distributor but with a 12-foot bell, the figures being for 11 months' operation in both cases:

	Tons per day.	Pounds coke per ton iron.
With Killeen distributor...	497.7	2,240
Without Killeen distributor	531.1	2,029

This type of ring served one good purpose in that it protected the stock line of the furnace, but operating conditions were such that we could not afford to pay the price for this protection.

McDonald Distributing Ring

The McDonald distributor, shown in Fig. 10, differs from the Killeen in that the large bell is of standard diameter, the same as would be used without the distributor, and the distributing ring is raised or lowered as desired. The usual method of operating this type of top is to keep the distributor in the upper position clear of any material as it leaves the bell for three or more charges. The distributor is then lowered and the succeeding charge is dropped into the furnace.

Having a movable distributor, the operator can throw the fines toward the wall from the large bell, the distributor being in the upper position and out of the path of the raw material; or, by lowering the distributor, the operator can throw the major portion of the coke to the center of the furnace, with the fines and excess of ore away from the wall.

Slick Distributing Ring

One of the latest developments in distributing rings below the large bell is the one designed by E. E. Slick, and shown in Fig. 8. This distributing ring is permanently set in the furnace top and combines some of the features of the Killeen and McDonald rings, with the further and radical development that the lower portion of the ring consists of a number of fingers equally spaced, with the lower end projecting inwardly.

As the material leaves the large bell, those portions which impinge upon the fingers are deflected toward the center of the furnace, the portions which pass between the fingers con-

Presented at the New York meeting of the American Iron and Steel Institute, May 26-27. The author, George W. Vreeland, is superintendent of blast furnaces, Carnegie Steel Co., Mingo Junction, O. This is the last of three installments.

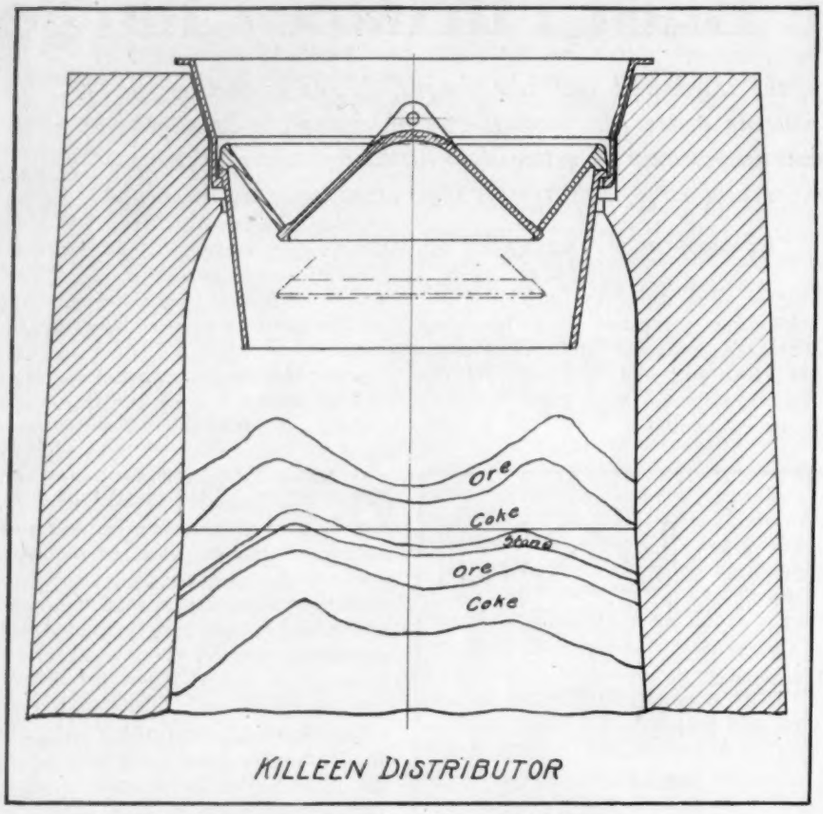


FIG. 9—DETAILS OF KILLEEN DISTRIBUTING RING

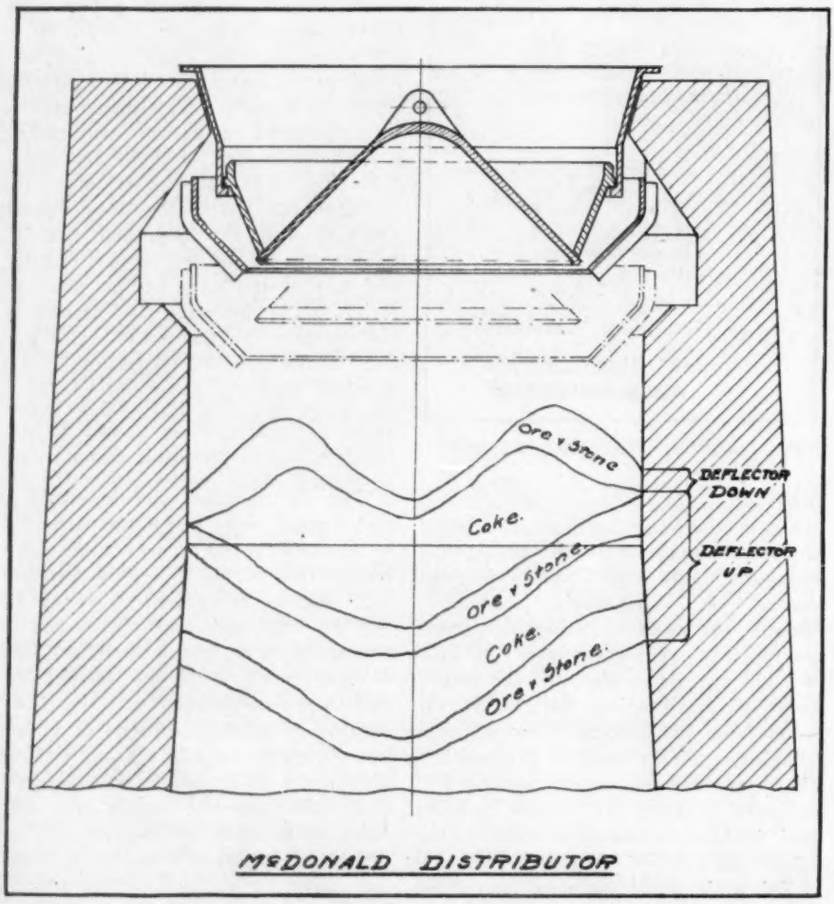


FIG. 10—DETAILS OF McDONALD DISTRIBUTING RING

tinue in their travel outwardly towards the walls of the furnace, and that which impinges against the upper portion of the straight ring or skirt drops more or less vertically.

In this way the charge is deposited in the furnace so as to form a number of vertical columns. These columns of finer stock are formed by the separation of the coarser portions of the charge which roll down from each of the small mounds formed on the surface at the stock line.

This design permits of a relatively uniform ascent of the gas, due to the lines of greater porosity surrounding the denser columns of fine materials, and also tends to give a more intimate mixture of the raw materials over the entire area with a certain percentage of fines close to the walls, which condition we have found is so necessary for our operation. The use of the Slick distributing ring has shown some meritorious results.

As such excellent work is being done on furnaces without a distributing device below the large bell, its necessity is not apparent, at least under our present conditions.

Economic Importance of Improved Blast Furnace Operation

So much for the technical and present-day aspect of this problem of distribution, the importance of which will not be underestimated by any furnace operator. Smooth operation, quality of product, minimum labor cost, low fuel consumption, high yield and large tonnages, are all matters of prime importance today. But no paper on this subject would be complete that did not at least touch on that great economic problem wherein the practice of today has its direct bearing on the problems of tomorrow. I refer to the conservation of our natural resources, and particularly to the conservation of those raw materials connected with the iron and steel industry.

Nature has bountifully endowed us. The largest and richest coal and ore deposits have been given into our keeping for our own use in this generation and as trustee for future generations. If we are to discharge that obligation conscientiously, we should see to it that in this, our generation, all metallurgical processes and operations shall be so conducted that waste and loss in raw materials are reduced to that point which, based on our ability, is the lowest practical limit.

The estimated amount of iron ore to be brought down from the Lake Superior region this year reaches the enormous figure of 66,000,000 gross

tons, practically all of which is to be used for the production of pig iron. If by more perfect distribution of our raw materials in the blast furnace and with other improvements that could be effected in many furnaces, a saving of only one-half of one per cent of the metallic yield should be effected over this entire quantity of lake ore, it would mean that 610,000 tons of iron ore could therefore be reserved annually for future consumption. Since the more perfect distribution reduces our metallic loss, so does it reduce the coke consumption, as they go hand in hand; and if we could reduce our coke consumption for the smelting of this quantity of ore by 5 per cent, we would save 1,750,000 tons of coke, with 2,500,000 tons of coal left in the mines for future generations to use.

The thought of effecting a saving of one-half of 1 per cent in yield and 100 pounds of coke per ton seems small when we talk of them in our every day practice, but in the aggregate they amount to large figures.

If we convert the 610,000 tons of ore and the 1,750,000 tons of coke into dollars and reconvert this money into labor, where the larger part of the cost originated, we can appreciate not only the loss of the raw material but the enormous economic loss represented by labor.

Quick Work in Building Blast Furnace

AN UNUSUAL achievement in blast furnace construction has just been accomplished by the Cambria Steel Co., Johnstown, Pa., involving the erection of a 500-ton blast furnace in 85 days. On March 6, 1916, the directors of the company authorized the construction of a new furnace. On March 9, E. E. Slick, vice president and general manager, approved a general layout for the furnace and the engineering department began active work preparing plans. In clearing the site, the slag machine and part of the cast house for No. 7 blast furnace had to be removed, together with the steam line between the boiler and power houses, and the heavy power lines supplying the Franklin works and mines. On March 12 the actual construction commenced. The new furnace and stove foundations were staked out and at the same time the engineering department was rushing the preparation of detailed plans and drawings.

BLAST FURNACE BUILT IN 85 DAYS

This furnace was lighted by Miss Jane Ogden 12-year old daughter of John C. Ogden, at 12:45 noon June 5, 1916

The furnace foundation was completed on April 7, and on May 6, 29 days later, the steel work was completely erected. The bricklayers commenced laying the hearth on April 15, three weeks before the completion of the steel work, and they completed lining furnace, bleeders and bustle pipe May 13, 28 days after starting on the hearth and seven days after completion of the steel work.

On March 12 excavations for the hot blast stoves and chimney were started, and on March 16 the concrete foundations were begun. The excavations were completed on March 29 and the foundations on March 31. The steel work erection for the four stoves was commenced April 4 and two were erected on April 28; the bricklayers commenced laying brick in these stoves on the same date and the second pair were erected by May 12.

The excavation for the skip pit was commenced April 1 and the bridge was completed May 31, including the installation of an Otis steam hoist.

In connection with this work, extensions were made to the boiler house building to take care of 12 300-horsepower Babcock & Wilcox boilers equipped with superheaters. The present blowing engine house was extended to accommodate a 48 x 86 x 84 x 60-inch Hooven, Owens & Rentschler engine. The air end was designed by Mr. Slick, in order to secure the prompt delivery required.

Has Good Record

The International Oxygen Co., 115 Broadway, N. Y., states that, although the total generating capacity of the I. O. C. oxygen-hydrogen apparatus installed to date is many times the aggregate of all other electrolytic apparatus for the same purpose, there is not one instance of an explosion of gases due to defects in I. O. C. equipment. The company credits this exceptional record to the fact that, in the design and construction of its apparatus every known precaution is taken to secure the utmost purity of gases, to prevent gas leakage, and to eliminate possibility of the intermingling of the oxygen and hydrogen in an explosive mixture.

Isaac H. Levin has resigned as chief engineer and chemist of the International Oxygen Co., and will devote his time to chemical research and as a specialist in the electrolytic field. Mr. Levin's temporary address is 186 Hillside avenue, Newark, N. J.

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

I. LAMONT HUGHES, assistant district superintendent, Carnegie Steel Co. mills, Youngstown, who was recently appointed district superintendent of the mills and furnaces of the Canadian Steel Corporation, at Ojibway, Canada, spent his boyhood days in Newcastle, Pa. In 1897, he graduated from the North Braddock high school and commenced work the same year in the engineering department of the Edgar Thomson works. From Braddock, he went to Donora, and assisted in building the plant of the Union Steel Co., which afterward became a part of the American Steel & Wire Co. In 1905, he went to Youngstown, to be engineer for the Youngstown district bar mills of the Carnegie Steel Co., and the following year, became assistant general superintendent. In 1911, Mr. Hughes became general superintendent of bar mills in the Youngstown district, and on Jan. 1, last, was promoted to be assistant district general superintendent at Youngstown, where he has been associated with James H. Grose, in beginning work on the McDonald mills and supervising operations at the Ohio works, upper and lower mills, Niles furnace and the Greenville works.

C. J. Kirk, president of the United States Sherardizing Co., New Castle Junction, Pa., has returned from California, where he spent the winter.

Horton Penrose, manager of the Pittsburgh office of Shimer & Co., Inc., Philadelphia, has returned from a business trip to California.

Charles Clifton, of the Pierce-Arrow Motor Car Co., has been re-elected president of the National Automobile Chamber of Commerce.

M. D. Tracy, of the purchasing department of the J. I. Case Threshing Machine Co., Racine, Wis., has resigned to accept the position of assistant purchasing agent of the Rumely Co., La Porte, Ind. Mr. Tracy assumed his new duties June 1.

E. A. Hatfield, for five years assistant secretary and general sales manager of the Bain Wagon Co., Kenosha, Wis., has resigned to take an active part in the organization of the Mississippi Valley Motor Car Co., St. Louis, which will become one of the largest distributors of automobiles and motor trucks in the United States.

D. W. Patten has been appointed Ohio representative for the New Britain Machine Co., New Britain, Conn. Mr. Patten for several years has covered the same territory for the Windsor Machine Co., now the National Acme Co., selling Gridley automatics.

W. B. Dickson, who has been secretary and treasurer of the Midvale

I. LAMONT HUGHES

Steel & Ordnance Co., has been made vice president of the company. He remains as treasurer but resigns the position of secretary. D. B. Gehley, now secretary of the Cambria Steel Co., has been made secretary.

Christopher M. Spencer, Hartford, Conn., the inventor of the Spencer rifle and other mechanical equipment, who fell last February and fractured his hip, has so far recovered from the fall as to be able to return to his work at the New Britain Machine Co.'s factory, New Britain, Conn. He will be 83 years old June 20.

Rollin C. Steece, vice president and general manager of the Brier Hill Steel Co., has tendered his resignation but will continue to serve as a member of the board of directors. For 26 years he has been actively identified with the Brier Hill intesests. In 1890, he went to Youngstown and entered the employ of the Brier Hill Iron & Coal Co. as chemist, remaining in this position one year, after which he was made superintendent of the Tod and Grace furnaces and subsequently general superintendent. When the Brier Hill Steel Co. was organized he was made vice president and general manager. Mr. Steece is a graduate of Case School of Applied Science, of Cleveland, and his first position of note was with the Dayton Coal & Iron Co.

James M. Nelson, for over a score of years employed at the Ohio works of the Carnegie Steel Co. in Youngstown, and superintendent of the open hearth department since 1908, whose resignation was announced May 15, has just been appointed superintendent of the duplex and open hearth departments of the Algoma Steel Corporation of Sault Ste. Marie, Ontario, Can. Mr. Nelson left Youngstown June 11 to take up his new duties at the Soo, where he will be under the supervision of Lawrence H. Cooney, a former Youngstown man now general superintendent of the Algoma Steel Corporation properties. Mr. Nelson is considered one of the most competent open-hearth superintendents in the country. He was given a hearty farewell by steel men in Youngstown.

P. M. LaRose, of Chicago, has been appointed commercial agent in charge of the Chicago office of the bureau of foreign and domestic commerce, succeeding Stanley H. Rose, who has resigned to become export manager for an eastern firm. Mr. LaRose is a graduate of the School of Commerce of the University of Chicago, and has had special training in New York City. He has been connected with the Chicago office for 14 months. The Chicago district covers Minnesota, Wisconsin, Michigan, Ohio, Iowa, North and South Dakota, Northern Illinois and Indiana. Business men in these states desiring information as to shipping, customs, duties in other countries, foreign correspondence, opportunities for selling abroad and other data on foreign trade will obtain personal attention by writing or calling at the office of the bureau, 504 Federal building, Chicago.

All Ready to Serve Their Country

Manufacturers Will Encourage Men to Enlist

Many Have Made Arrangements to Release Employes and Others Have Plans Under Consideration—An Interesting Leaf from the History of the Civil War Indicating What Would Happen in the Event of Another War

AMONG the interesting letters which have come in to the *Iron Trade Review* as the result of its request for an expression of opinion concerning the attitude of manufacturers in regard to President Wilson's Memorial Day address is one from President R. H. Sweetser, of the Thomas Iron Co., Easton, Pa., showing how that company met the crisis of the civil war. This letter, considered in connection with others published in this issue, furnish convincing proof that iron and steel manufacturers will do their full duty to their country. Mr. Sweetser writes as follows:

Referring to your letter of June 1 in reference to President Wilson's Memorial Day address at Arlington Cemetery, and especially to the attitude of business men, I send to you herewith a report of what was done by The Thomas Iron Co. during the Civil War.

This report is taken from the "Fiftieth Year Book" of The Thomas Iron Co., which was published in 1904:—

> "When, in June, 1863, the Confederates invaded the state of Pennsylvania, a special meeting of the board was called, and the action taken is shown by the minutes of June 29, 1863, as follows:
>
> "At a special meeting of the Board of Directors, held at the office of the company at Hokendauqua, Monday, June 29, 1863, pursuant to notice by telegraph of the President; present, Messrs. C. A. Luckenbach, W. H. Talcott, David Thomas, R. S. Chidsey, John Drake and B. G. Clark.
>
> "The President (Mr. C. A. Luckenbach) stated that, in consequence of the invasion of the state by the rebels, he had, upon consultation and in connection with parties interested in the Lehigh Valley Railroad Co., Lehigh Valley Furnace, and the Lehigh-Crane Iron Co., proposed to continue to pay wages of those men employed, who would be willing to volunteer for the defense of the state, and that the meeting had been called to take into consideration the propriety of blowing out some of the furnaces; whereupon, on motion,
>
> "Resolved, That the action of the president in offering to continue the pay of the men who would volunteer for the defense of the state, for 90 days, be approved, and that the officers of the company are hereby authorized to carry out the arrangement.
>
> "Resolved, That No. 3 furnace be blown out."

I have no memorandum to show how many of the employes paid their last sacred duty to their country with their lives; but a monument in Fairview cemetery, Hokendauqua district, to which the company subscribed, is but one of the silent testimonials to their courage and devotion. The monument bears, among other names, those of Charles Miller, Joseph Shelly, Stephen Sheirer, Charles Boyd and John Kane, employes of The Thomas Iron Co., who lost their lives during the war, with the following inscription:

> "To perpetuate the memory of those from this vicinity, who, with heroic valor and noble patriotism, on many battlefields fought for freedom and to crush rebellion. This monument was erected by their loyal and deeply grateful friends—1866."

Extract from the minutes of Jan. 4, 1866, follow:

> "Resolved, That the sum of $300 be, and is hereby, donated towards erecting a monument at Fairview cemetery, Hokendauqua district, to the memory of persons formerly in the employment of the company and others who have fallen in the defense of our country in suppressing the late rebellion."

This monument was the first to be erected in the United States in memory of soldiers who fell during the civil war.

The above items may be of historical interest and not bearing on the present issue, but it is a record of what one iron company did when the country called for its employes to go to the front. I believe that the same action will be taken if there was a similar need in the future.

One Important Condition

BY ALEX. GLASS

President, Whitaker-Glessner Co., Wheeling, W. Va.

WE ARE in favor of our employes of suitable age volunteering and we will make no deduction for time lost up to 30 days per year. We will make only one condition, and that is that applicants for leave for this purpose intend giving their services to the government in case of war.

Favor the Militia

BY ROBT. P. LAMONT

President, American Steel Foundries, Chicago

OUR employes are allowed to go to any of the "Preparedness" camps, without prejudice and without loss of wages. The only condition we make is that in the event of too many wishing to get away at one time we reserve the right to so arrange the schedule as not to cripple our organizations.

I have only recently been converted to the belief that the only successful way to raise a volunteer army in this country is through the militia. This was not my original opinion, but, after hearing a thorough discussion of the matter, in which the militia side was presented by the heads of the various military organizations in this state, I am convinced that it is the only practical way in which we can get a satisfactory volunteer army in times of peace. We not only have no objection to our men joining these companies but we are glad to encourage them in any way we can.

Some Original Ideas

BY WM. METCALF JR.

President, Braeburn Steel Co., Pittsburgh

OUR COMPANY is in favor of establishing an army and navy of sufficient strength to properly protect our country from the invasion of a possible foreign enemy. As to the extent or method of such prevention we do not feel qualified to speak, but rather regard this as a matter that should be determined by our military and naval experts. Whatever the conclusion of the experts may be should be taken as the basis for intelligent co-operation not only of manufacturers, but all business houses, bankers, farmers and professional men as well throughout all parts of the country.

Answering as directly as we can your inquiry:—If the President in his speech means, "Will the manufacturers of the United States permit their men to take the necessary time to attend military encampments of the national guards of their respective states or the national encampments that are now being held?" we can answer, yes. In other words, we will pay our men full wages for the time that they may be absent from the plant on such military service. If they should join the state militia and be called out at any time, we will pay them their wages in full during that particular service period.

If, on the other hand, the President by his question means, will we permit our men to enlist in the regular army of the United States if the enlistment is not compulsory, we would at first hand be obliged to reply, no. The reason for this attitude, we believe, is obvious to any right-thinking mind. If military service is made compulsory, so that every man of military age serves a given number of days per year in our army, then there should be embodied in that law a clause compelling all corporations, and other employers, to pay their men in full for the time spent in the military service. If the employer does not pay his men's wages in full during the time of service, he should at least pay them the difference between the government pay and the men's ordinary wages.

If enlistment is voluntary, then our company could not afford to pay full wages to such of its men as might enlist unless our competitors in business have an equal proportion of enlisted men to whom they pay wages during their time of enlistment. It might be that because of better management and organization, one company could pay its men while on military service whereas another company might not be able to do so. The solution to this situation, it seems to us, is compulsory military service with compulsory pay to the enlisted man by his employer during the time of military service.

One other plan seems feasible and, we believe, could be put into operation without fraud or injustice and would more equally distribute the burden of providing funds for an adequate army and navy. We have in mind compulsory military service with the proviso that during any period of military service the enlisted man shall receive from the government of the United States the same compensation that he receives from his employer. This plan, it seems to us, is the most equitable one, for the reason that it protects all classes of employers. For instance, a small merchant or farmer employing only one or two hands might not be able to afford to pay such employes during the period in which they would not be productive. If the small merchant or farmer could carry on his business for the time of enlistment without taking on another employe in place of the enlisted man, he might possibly be able to pay the wages of his employe. If, on the other hand, his employe's enlistment should necessitate taking on an extra man at full wages, or possibly more, many cases might arise in which the employer could not stand the burden.

In conclusion, will say that we are for preparedness and that we will join heartily in any intelligent movement for adequate defense so long as such movement does not put us to a disadvantage in business competition. We are entirely willing to bear our share of all burdens of taxation provided that not only our competitors, but corporations engaged in other lines of business, bear an equal share.

P. S.—We do not manufacture munitions, have no facilities for so doing, and do not contemplate engaging in that branch of the steel industry.

Treat All Alike

BY JNO. A. TOPPING

Chairman, Republic Iron & Steel Co., New York

TO IMPUGN the loyalty of business by suggestions of acid tests is to discredit business history. Furthermore, as preparedness is suggested by reasons of protection rather than by selfishness, corporate interests will, for business reasons, co-operate in this movement as they have indicated their willingness in all other matters for general good. Preparedness, however, to be effective, should be obligatory and place obligations of a mutual character on both the employe and employer.

Insurance, Not Sacrifice

BY H. E. FIELD

President, Wheeling Mold & Foundry Co., Wheeling, W. Va.

IN REPLY to the following paragraph from President Wilson's Arlington address, quoted in your letter of June 1:—

> "It is all very well to say that somebody else must prepare, but are the business men of this country ready themselves to lend a hand and sacrifice an interest in order that we may get ready? We shall have an answer to that question in the next few months. A bill is lying upon my table now, ready to be signed, which bristles all over with that interrogation point, and I want all the business men of the country to see that interrogation point staring them in the face."

We are and have been ready to do our part in the preparedness program. It will not be a *sacrifice* of interest, but an *insurance*. We need not wait for the "next few months"; it can be answered now.

The business men have long seen actualities more definite than "that interrogation point staring them in the face". The "acid test" will not be necessary, if it applies to employers allowing employes to volunteer. The employers are more than ready, and even if they were not, the employes would volunteer.

In Hearty Accord

BY W. A. THOMAS

President, Brier Hill Steel Co., Youngstown, O.

WE ARE in most hearty accord with the movement to permit employes (a reasonable quota) to volunteer for the service of their country. We, however, have not worked out as yet a policy covering same, but expect to do so very shortly.

However, such a movement on the part of our employes, would have to be under the control of our general superintendent and foremen, for the reason that we could only permit a reasonable number of men leaving each department at a stated time.

Will Have Vacations

BY PICKANDS, MATHER & CO.

Cleveland

WE NOW have under consideration, and expect to arrange a satisfactory plan, whereby employes connected with our various enterprises will be given permission to attend training camps in their several localities, not only without loss of pay during the time, but also without loss of their usual vacations.

We are sure, with you, that the President will find a prompt and hearty response to his call.

Moral and Money Support

BY JAMES LORD

President, American Iron & Steel Mfg. Co., Lebannon, Pa.

IT HAS been our policy for a number of years past to encourage the citizen soldiery not alone by our moral support but with our money.

The same policy will be continued.

Favors Voluntary Service

BY L. R. LEMOINE

President, United States Cast Iron Pipe & Foundry Co., Philadelphia

REPLYING to your favor of June 1, this company will co-operate in any way it can consistently in promoting voluntary military service.

Patriotic Work at Home

BY JAMES BOWRON

President, Gulf States Steel Co., Birmingham, Ala.

THE policy of this company in reference to the promotion of military preparedness must necessarily be dictated by its directors. Without consulting them in the premises, I am unable to speak with authority.

My own individual opinion is, first, that in the iron and steel trade, embracing its subsidiary, the coal trade, the services of our men in their regular vocations would be of greater value to the United States government than their services could possibly be in the trenches. It has been found necessary in England and France to exempt from service at the front those engaged in these industries, who have been marked as star classes. An experienced melter of steel, in my opinion, would be of greater benefit to the government remaining at his ordinary work than if he were in the trenches.

I would favor keeping places open for any of our men who should desire to join the various camps or ships of instruction.

I would favor any of our men joining the national guard where they can drill in their leisure time, and keeping their places open for them when they should be absent at the annual encampments.

I favor universal service on the Swiss model, and believe that it should begin with all children of school age.

Ready to Help

BY J. SHEARER

Advertising Manager, Industrial Works, Bay City, Mich.

WE CANNOT give a definite expression as to the policy of this company, because some of those who would determine the policy are away. However, the writer feels sure that this company would do everything to aid rather than to prevent national preparedness.

As the equipment of this company is so well adapted for work on war materials, it seems as if better service would be given in case of war if most of our employes remained at work, rather than actually going to the front.

Has Hope for Congress

BY B. F. BOURNE

President, The Bourne-Fuller Co., Cleveland

AS TO military training for employes, we are heartily in accord with this movement, and wishing to be among the first to co-operate, we agreed in writing several months ago that our employes, to a reasonable extent, would be permitted and encouraged to attend military training camps without loss of pay and without prejudice to their positions. In any other way which we can properly, we will support the preparedness plans of the President and we very much hope that a majority of our senators and congressmen will do the same.

Free to Enlist

BY J. C. MILLER

Secretary, Columbus Iron & Steel Co., Columbus, O.

IT WILL be the policy of this company to promote in every way possible the organization of a volunteer army.

A short time ago, the members of our hospital staff became affiliated with the hospital corps of the National Guard.

We shall be glad to take any necessary steps to make our men feel free to become affiliated with the volunteer army under any plan that may be inaugurated by the government.

Iron and Money: Fact and Comment

Wall Street Marks Up Quotations for Iron and Steel Stocks as Republican Factions Unite Behind Common Candidate

WALL street has attached more importance to the party convention in Chicago than to any similar affair in many years. Active interest was displayed in all the proceedings and the actual speculative trend from day to day was governed largely by the course of developments at the sessions. Convinced that a harmonious union of Republicans and Progressives was about to be effected toward the close of last week, certain important operators in the stock market bought up large blocks of United States Steel common. Rumors began to emanate from the "street" telling of a powerful pool in Steel. It was claimed that this pool had taken up the overhanging English supply and would be ready to begin operations as soon as the convention was adjourned. The goal of par, five points above the previous high record established in 1909, was declared to be in sight for Steel common. Why does the stock market let its judgment be swayed, one way or another, by the outcome of a political convention?

Only one explanation seems to be in order. Wall street considers the Republican platform the most favorable to business interests, and feels that a united party, led by a strong man, will be in the ascendency next November. The change of administration would be followed, the stock market reasons, by a speedy movement to revise the tariff duties upward, and also by the abandonment of certain socialistic tendencies of the party now in power. The tariff is a matter highly important to the steel trade. The period of industrial depression which began in 1913 and was accentuated by the war at its outbreak in August, 1914, was ascribed primarily to the disastrous operation of the Underwood-Simmons tariff law by leaders in both the iron and steel industry and in the financial world. Long before iron and steel prices began to decline and works to close, the stock market drastically marked down quotations for iron and steel securities. But, of course, the sudden declaration of war was a powerful factor in making the financial and industrial conditions temporarily much worse than the tariff could possibly have made them in so short a time. The table on this page shows the trend of the shares of the United States Steel Corporation and a few representative independent steel companies following various events in connection with the Democratic tariff bill, together with the effects of the war upon prices of the same securities.

Steel Stocks Reflect Influence of Tariff and War

	a Nov. 6, 1912.	b Feb. 25, 1913.	c Oct. 4, 1913.	d July 30, 1914.	e Oct., 1914.	f Jan. 1, 1915.	g Jan. 1, 1916.	h June 10, 1916.
U. S. Steel, com.	78	60	58	51	38	51	89	85¼
U. S. Steel, pfd.	113	107	107	106	98	106	117	119
Beth. Steel, com.	46	35	33	30	25	52	458	445
Beth. Steel, prfd.	75	65	71	81	..	96	157	135
Cambria Steel	51	49	50	43	..	42	76	85
Repub., com.	33	24	19	18	..	20	55	47⅞
Repub., prfd.	93	84	79	78	..	77	110	111½

a On Nov. 5, 1912, Woodrow Wilson was elected president.
b On Feb. 24, 1913 Mr. Wilson announced special session of Congress to revise the tariff.
c On Oct. 4, 1913, President Wilson signed the revised tariff bill.
d The last day the New York stock exchange was open, just as the war began.
e During the period the exchange was closed, unofficial trading in the new street or "gutter" market registered these low prices.
f At the beginning of 1915, the steel trade was beginning to revive, under the stimulus of impending war orders.
g The war order movement was reaching the maximum.
h Closing prices last Saturday.

United States Steel common may go to par, although it is paying but 5 per cent per annum at present, its usual rate in past years. From the standpoint of current earnings, Steel common is entitled to a far higher disbursement than 5 per cent, for it is commonly estimated that the Corporation will earn 40 per cent on its common stock this year. However, it is unlikely that the Corporation management will change its dividend policy radically in the near future. Recent rumors have asserted that Chairman E. H. Gary and Henry C. Frick both favor the declaration of an extra dividend when the directors meet next month, which rumors may be taken for what they are worth. The surprise which has greeted various decisions of the Corporation's management in the past few years demonstrates that the minds of the executives are not quite so easily read. The Steel Corporation's influence is far-reaching; its every move must be considered in the light of its effect upon public sentiment and general business. Chairman Gary is fully aware of this responsibility and his policy has been guided by his broad knowledge of the need for caution in these critical times. On several occasions in the past 12 months the judge's remarks have emphasized the necessity that businees men be conservative, avoid undue expansion and in all things prepare for the readjustment which seems inevitable. When the Steel Corporation passed its common dividend in January, 1915, following the record low earnings in the last quarter of 1914, the financial community quivered. The deplorable conditions through which the steel trade had been passing when brought home to the general public, for the passing of the dividend hit pocketbooks all over the country. At this very time the tide had turned in the steel trade, earnings were on the verge of improvement and the industry was on the threshhold of the greatest era of high earnings it has ever known, or ever will know, in proportion to capital invested.

In much the same way, if the Steel Corporation management were to share present phenomenal profits in a radical way with stockholders, disactrous results might follow, among them an ill-timed period of wild speculation on the stock exchanges. The Corporation may make small extra payments this year to compensate stockholders for the suspension of returns last year, but, for the most part, profits will be used to strengthen the Corporation's financial position. Possibly a reserve fund will be set aside from which to pay dividends in years when steel is a pauper.

Wall street has been fully aware of the steel trade's well-being for months

past, but has failed to wax enthusiastic in the face of developments which have emphasized this prosperous condition. The prospect of after war readjustment has hung like a cloud over the steel trade's outlook; this the stock market seems to have been unable to forget. The Chicago convention alone has succeeded in stimulating the long lagging stock market interest in the steel shares.

Below is a table showing quotations of various important iron and steel stocks on the New York stock exchange at the close of business June 10 and net changes for the week:

	Close June 10.	Net chg.
American Can	56⅝	+1⅛
American Can, prfd.	110	—1
Amer. Car & Fdy.	60¾	+2¼
Amer. Car & Fdy., prfd.	118⅛	+1
American Locomotive	73¼	+1¾
Amer. Locomotive, prfd.	101¾	+ ¼
Amer. Steel Foundries	51¾	+1⅛
Baldwin Locomotive	90¾	+1⅜
Baldwin Locomotive, prfd.	110	+ ¼
Bethlehem Steel	445	.....
Bethlehem Steel, prfd.	135	.....
Colorado Fuel & Iron	43½	+1
Continental Can	101	+1
Continental Can, prfd.	111	—1
Crucible Steel	86	+3
Crucible Steel, prfd.	118	+2
General Electric	172	+2½
Gulf States Steel	86½	— ½
Gulf States Steel, 1st prfd.	100	—1
Gulf States Steel, 2nd prfd.	89½	+1½
International Harv. of N. J.	118	+6
Inter. Harv. of N. J., prfd.	119½	+2½
Internat'l Harv. Corp.	82½	+ ½
Inter. Harv. Corp., prfd.	108	+1½
Lackawanna Steel	71⅜	+2⅜
Nat'l Enamel'g & Stmp. Co.	24	+ ⅜
Pressed Steel Car	49	+3
Pressed Steel Car, prfd.	100¼	+ ¼
Pullman Palace Car	164	.....
Republic Iron & Steel	47⅞	+ ⅜
Republic Iron & Steel, prfd.	111½	— ⅜
U. S. Cast Iron Pipe & Fdy.	24	+ ¾
U. S. C. I. P. & Fdy., prf.	53½	+2½
United States Steel	85¾	+2¼
United States Steel, prfd.	119	+ ⅝
Westinghouse Mfg.	61¾	+ ½

The following table shows changes in maximum quotations of stocks not listed on the New York exchange:

	June 9.	June 2.
American Radiator	395	398
American Ship Bldg.	45¼	.....
Cambria Steel	85	82⅜
Chicago Pneumatic Tool	73½	73¼
LaBelle Iron Works	52¼	52¼
Lake Superior Corpn.	10¼	10⅜
Stewart-Warner Speed. Co.	108⅞	92
Warwick Iron & Steel	.....	11⅛
Westinghouse Air Brake	137½	137
Westinghouse Elec. & Mfg.	61⅝	62⅛

Stockholders of the Rogers, Brown Ore Co. at a meeting in Chicago elected the following directors: Charles T. Boynton, Clifford D. Caldwell and Charles A. Stillman, Chicago; William A. Rogers, Buffalo; J. K. Pollock and D. B. Meacham, Cincinnati; D. T. Croxton and Livingston S. Mather, Cleveland; W. L. Robinson, Rochester, N. Y.

The following officers were elected: President and treasurer, Charles A. Stillman; vice president, Charles T. Boynton; secretary, Charles Hubbard.

The company is operating the Kennedy mine and during the past year has opened the Meacham mine, both on the Cuyuna range; the Meacham mine this week shipping its first ore to docks at Superior, Wis.

Financial Crop Ends

THE plant of the Vulcan Charcoal Iron & Steel Co., Crum Lynne, Pa., which recently was purchased by Walker Bros. & Haviland, 1532 Samson street, Philadelphia, has been sold by the latter, but the name of the purchaser has been withheld for the present. It is understood that the new owners propose to considerably improve the works and place it in early operation. The Vulcan Charcoal Iron & Steel Co.'s works are at Eddystone, Pa. The plant was built in 1887-1888, and enlarged in 1900; was destroyed by fire in 1901 and rebuilt the same year. The products consist of tin plate bars and skelp iron for boiler tubes. Annual capacity is 24,000 tons.

* * *

Papers of incorporation have been taken out at Dover, Del., by the Mark Mfg. Co., Chicago, with a capitalization of $10,000,000. The formation of this company is in connection with the announced purposes of the Mark company to erect a new steel works at Indiana Harbor, Chicago district. The papers were taken out by professional incorporators.

* * *

Directors of the Midvale Steel & Ordnance Co. yesterday elected W. B. Dickson, formerly secretary and treasurer, to the new office of second vice president. Mr. Dickson continues as treasurer, but is succeeded as secretary by D. B. Gehley, who occupied a similar position with the Cambria Steel Co., which was absorbed by Midvale.

* * *

From Bridgeport, Conn., comes the rumor that the Remington Arms-Metallic Cartridge Co. has purchased a controling interest in the Chevrolet Motor Co. intending to produce a low priced car at its plant after the European war is over and the munition contracts are all filled. Chevrolet stock went begging at 86 a year ago. Recently 3,000 shares of the stock changed hands at 230.

* * *

The Duplex-Power Car Co., Charlotte, Mich., announces that its directors at their meeting June 7 increased the stock of the company 25 per cent and in the near future probably will make another advance of 25 per cent. It states that the company's business is showing a big gain and that shortly large additions probably will be built. A 10 per cent dividend recently was paid and it is expected a similar payment will be made in August.

* * *

The three blast furnaces of the Wellston Steel & Iron Co., Wellston, O., were sold for $294,000 at receiver's sale on June 5. The two Wellston furnaces were purchased by S. E. Sternberger, of Jackson, O., for $210,000 and the Milton furnace was taken by H. S. Willard Sr., of Wellston, for $84,000. The purchasers were both bondholders of the company. Efforts will be made to put the furnaces in blast in the near future. The Wellston Steel & Iron Co. was incorporated in 1905, having a capital stock of $1,000,000 and bonds of $507,000. Mr. Sternberger and H. S. Willard Jr. were appointed receivers Nov. 23, 1915. The two Wellston furnaces were built in 1874-1875, and last rebuilt in 1908; the Milton furnace, constructed in 1873-1874, was last rebuilt in 1912. The company has annual capacity of 120,000 tons of car wheel, strong foundry and malleable pig iron.

* * *

Common and preferred shares of the United States Steel Corporation are taxable in Kentucky, when held by residents of that state. This decision was handed down by the Kentucky court of appeals, reversing a circuit court judgment in a case where stockholders of the corporation omitted from assessment blocks of stock which they owned. They claimed the stock was exempt since the American Bridge Co. and the American Steel & Wire Co., subsidiaries of the Corporation, pay taxes in Kentucky.

* * *

The Watt Mining Car Wheel Co., Barnesville, O., has sold to Tillotson & Wolcott, Cleveland, an issue of $120,000 first mortgage 6 per cent bonds. The bonds mature serially in 10 equal installments of $12,000 each July 1, 1917 to 1926. The company has been operating 50 years. The proceeds will discharge indebtedness incurred through expenditures for extensions. Net earnings for the current year are estimated at $45,000. Total fixed and current assets have been appraised at $589,000. The bonds are offered at par and interest.

* * *

Stockholders of the Barney & Smith Car Co., Dayton, O., this week elected the following directors: A. Clifford Shinkle, Lawrence Maxwell, Charles L. Harrison, Edward L. Heinsheimer and H. W. Lithmann, Cincinnati; Eugene J. Barney, H. M. Estabrook, A. J. Stevens and J. F. Kiefaber, Dayton. The new members chosen were Messrs. Shinkle, Lithmann and Heinsheimer. They succeeded James L. O'Neil, Pittsburgh, and E. L. Potter, New York, both of whom retired, and the late John Ledyard Lincoln, of Cincinnati, whose death occurred several months ago. This was the first meeting of the stockholders since the disastrous 1913 flood.

* * *

There are no official grounds for a statement published in the metropolitan press that announcement has been made by the Bethlehem Steel Corporation of its plans to expend from earnings a total of $70,000,000 in plant improvements and extensions during the next several years. While it is generally known and has been previously referred to on various occasions that the Bethlehem Steel Corporation has in view a large program for enlargements at South Bethlehem and other points, the detailed character of these improvements has not been made public and announcement is not expected for some time, since many decisions remain to be made.

Forge Men Read Technical Papers

Members of American Drop Forge Association Convene in Philadelphia—
Supplymen's Organization Formed—Officers Elected

THE third annual convention of the American Drop Forge Association, at the Hotel Adelphia, Philadelphia, June 9 and 10, proved the best attended and most enthusiastic gathering so far held by that organization. Technical papers of a high order were submitted and most of these aroused a wealth of discussion. One of the leading features of the convention was the formation of a new organization, the Drop Forge Supply Association. Of this H. N. Taylor, N & G. Taylor Co., Philadelphia, was chosen chairman, and A. L. Wurster, Heppenstall Forge & Knife Co., Philadelphia, secretary and treasurer. The function of this association in the future will be to co-operate wherever possible with the American Drop Forge Association, and to take charge of all entertainment features of future joint conventions of the two associations. The committee in charge of the new association will be augmented by a third member to be selected each year from the city in which the convention will be held.

Welcoming addresses were made by Howard B. French, president of the Philadelphia Chamber of Commerce, and E. J. Cattell, city statistician, of Philadelphia. The retiring president, F. A. Ingalls, in his opening speech, said that while the present state of the drop forge industry is unusually prosperous and promises to remain so indefinitely, it behooves the members of the industry to proceed carefully, since the dark cloud of depression will loom up some time in the future. It will pay to have on hand at that time as little high-priced steel as possible. He quoted from *The Iron Trade Review* to show current conditions in the steel industry.

R. T. Herdegen, Dominion Stamping & Forging Co., Windsor, Ont., the newly elected president of the association, submitted an important paper on the "Selection of Proper Machines for Making Forgings". Many drop forging establishments, said Mr. Herdegen, do not make a proper study of allotting the different kinds of forgings to the machines, which will produce them most economically. For some work the steam hammer proves most practical and economical, while for other kinds the board hammer is to be preferred. With still other kinds the upsetter or forging machine proves most satisfactory. He submitted figures to show the relative advantages of each kind of machine in producing certain automobile forgings. Mr. Herdegen declared that lack of knowledge as to just what kind of machine is the best for a certain job often leads to the quoting of improfitable prices by shops which think they should quote as low as others, despite the fact that the others are better equipped to do the work. Mr. Herdegen's paper was followed by a lengthy discussion in regard to the performance of different kinds of machines engaged on the same kind of work.

A. A. Motherwell, Buick Motor Car Co., Flint, Mich., delivered two interesting papers, one on "Methods Pursued in Making 6-throw Crank Shafts", and the other on "The Hammer-Hour Overhead System". In the latter paper the author described in great detail the methods adopted by the Buick company in keeping track of the costs in its forging department. After taking into account all such factors as cost of buildings and equipment, maintenance, insurance, depreciation, power, share of the office expense, etc., the company distributed the total overhead among the different machines, groups of furnaces, etc., and then sub-divided each of these figures in order to determine the burden per hour to be charged to each unit of productive equipment. With this burden definitely fixed, it is easy, taking into account the cost of labor and material, and the estimated time of production, to estimate within a few cents, the cost of producing any forging. In order to estimate correctly the time for production, the forging department maintains a file which contains data regarding the production of every kind of forging that ever has been made at the Buick shop. By this system the company not only is able to base its prices upon actual costs but it is able to tell whether or not a given machine is producing as much as reasonably may be expected from it. This plant also maintatins a man whose sole duty it is to go the rounds of the forge shop and devise ways of preventing waste of steel. Last year the economy in the use of steel effected in this way amounted to about $6,000. In the discussion which followed, Mr. Motherwell stated that the growing desire for forgings which are made to such fine limits as to eliminate the necessity for machining, should not be encouraged. In his own shop, he said, he refuses to make work to finer limit than 0.064-inch, plus or minus.

S. A. Keller, Keller Mechanical Engraving Co., Brooklyn, described a machine recently put out by his company which, in view of the growing scarcity of die-sinkers, should prove useful in forge shops. This machine, with a wood pattern, a model or a forging as a guide, by means of a milling cutter, sinks a die in a short space of time. It may be operated by hand or automatic feed and one or more dies may be made as required.

H. N. Taylor, N. & G. Taylor Co., Philadelphia, delivered an interesting talk describing that company's method of doing away with such flaws as slivers, seams and pipes in manufacturing steel for use in forging. The occurrence of pipes has been eliminated by using small open-hearth furnaces, capacity of 25 tons each; by melting only selected basic pig iron and high-grade scrap; and by pouring small ingots from a bottom-pour ladle. The ingots are 10 inches square and weigh 750 pounds each. The steel in the ladles always is quiet, and the results are found to be much better than when the steel boils and bubbles violently. The company prevents the occurrence of seams by making a great many passes and thus making only a small reduction in cross section at each pass.

W. C. Lytle, Pangborn Corporation, Hagerstown, Md., submitted a paper on "Sand Blasting of Forgings". Sand-blasting proves far superior to pickling in the forge shop, said Mr. Lytle, since sand-blasted forgings do not rust so quickly, the presence of the acid fumes is eliminated, the forgings are more economical to machine, and the surfaces of forgings may be better prepared for enameling, plating, etc. In discussing the paper, J. E. Williams, warmly advocated the use of the sand-blast, saying a better price could be obtained for the product on account of its better appearance, and the forger is able, by its use, to detect all flaws. One speaker advocated use of shot instead of sand for blasting.

A. A. Holbeck, Bonnot Co., Canton, O., submitted a paper on the use

of powdered coal as a fuel for forge shop furnaces. In systems already installed it has been found that coal at $3.00 per ton figures out to a cost equivalent to fuel oil at 1.5 cents a gallon, thus showing the use of pulverized coal to result in great economy.

Howard Terhune, Chambersburg Engineering Co., Chambersburg, Pa., delivered a paper entitled "Floating Type Head for Board Hammers". J. F. Zwicker, Willys-Overland Co., Toledo, O., spoke on the forging of automobile front axles. W. C. Peterson, Packard Motor Car Co., Detroit, submitted a paper entitled "Heat Treatment of Drop Forgings". R. E. Kinkead, Lincoln Electric Welding Co., Cleveland, described how surface flaws in forgings may be corrected by the electric welding process. F. O. Andrews, Acme Machinery Co., Cleveland, spoke on "Recent Developments in the Use of Upsetters With Reference to Finished Gear Forgings". C. R. Cary, Leeds & Northrup Co., Philadelphia, spoke on the necessity for occasionally checking up pyrometers in order that they may be depended upon to give correct temperature readings.

Officers for the ensuing year are: President, R. T. Herdegen, Dominion Stamping & Forging Co., Windsor, Ont.; vice president, T. W. Sieman, Union Switch & Signal Co., Pittsburgh; secretary and treasurer, E. B. Horne, Packard Motor Car Co., Detroit, re-elected. The directors are: George Desautels, Imperial Drop Forge Co., Indianapolis; J. F. Zwicker, Willys-Overland Co., Toledo, O.; S. H. Carpenter, Atlas Drop Forge Co., Lansing, Mich.; E. J. Frost, Frost Gear & Forge Co., Jackson, Mich.; F. A. Ingalls, Ingalls-Shepard Forging Co., Harvey, Ill.

Cement Output Dropped

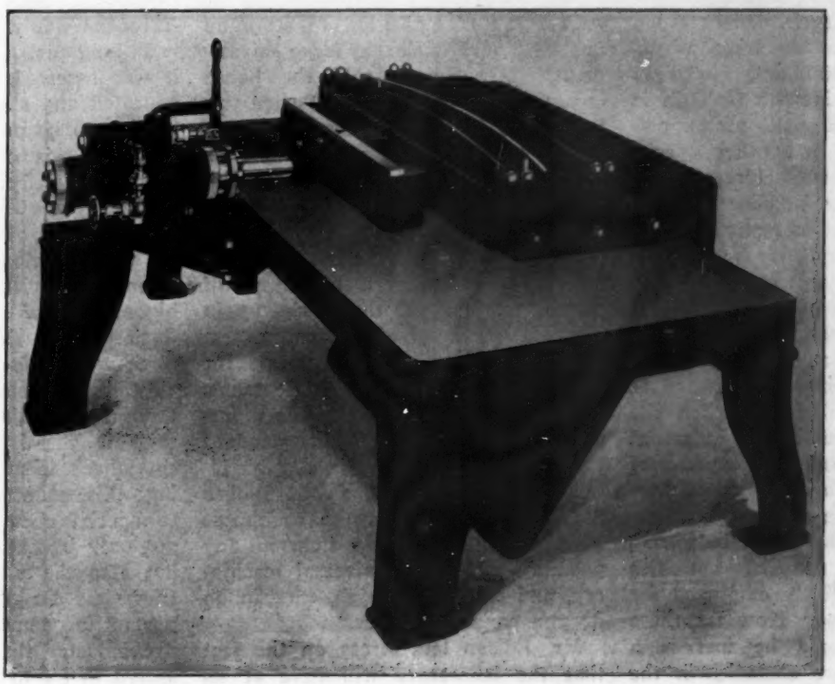
An advance statement of final statistics of the Portland cement industry in 1915 confirms the estimate published in January, of this year, that there was a slight increase in shipments and a slight decrease in production and stocks as compared with 1914. The stocks for 1914 represent figures revised mainly by the producers. The shipments of natural cement in 1915 were 750,863 barrels, valued at $358,627, a decrease in quantity of 422 barrels, and an increase in value of $7,257, compared with those of 1914. The shipments of puzzolan cement in 1915 were 42,678 barrels, valued at $39,801, a decrease in quantity of 25,633 barrels and in value of $23,557, compared with the shipments of 1914. Portland cement shipments were 86,891,681 barrels in 1915, compared with 86,437,956 barrels in 1914.

Develops New Spring Forming Machine

AN ELLIPTIC spring forming machine, which is said to be capable of shaping leaves of any size or curvature, has been developed by Joseph T. Ryerson & Son, Chicago. The machine consists of a heavy horizontal table, on which two dies and a pressure cylinder are mounted. A crosshead, as shown in the accompanying illustration, is fastened to the piston of the pressure cylinder. It contains a slot in which three adjustable dies are held. Any variation in curvature that may be desired is easily obtained by moving the outer dies. The female die is made up of 37 keys, resting on edge, side by side. They are held in a forward position by a series of counterweight levers, which hang under the table. The pressure exerted by the levers on the keys is sufficient to set the hot leaf of the spring when it is forced against the keys by the male die. In the operation of the machine, the hot leaf to be formed and the cold leaf which fits next to it in the completed spring are placed on edge on the table, with the latter against the crosshead, the leaves being centered by nibs on each die. Pressure is applied until the two leaves are forced against the bank of keys forming the female die. The hot leaf will then bend to the exact curvature of the cold one, as a result of the resistance offered by the counterweight dies. The hot leaf is then dipped into the tempering bath and placed on the table until the full set is built up, after which it is transferred to the assembling and banding press.

In many cases leaves will come from the furnace that are not straight edgewise. Such leaves may be placed in a horizontal position in front of the keys and readily straightened by one stroke of the crosshead.

The floor space required for the machine is approximately 7 x 7 feet. The height of the table is 2 feet 7 inches, and its dimensions 4 feet 3 inches by 7 feet. The keys and dies are 6 inches high, and the keyboard is 52½ inches wide.



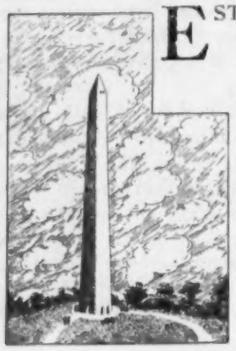
ELLIPTIC SPRING FORMING MACHINE

The crosshead is 36 inches long and has a maximum movement of 9 inches. The machine is primarily designed for railroad spring shop use and because of its simple construction and adaptability for shaping leaves of any size or shape, is believed to be an important development in spring shop equipment.

Business News of Nation's Capital

Proposed Establishment of a Government Laboratory as Part of a Program for Preparedness

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Washington, D. C., June 13.



ESTABLISHMENT of a government experimental laboratory as a part of the plan of preparedness, is being watched with great interest. Provision for such a plant, to cost $1,000,000, is made in the naval appropriations bill as it passed the house, and it is taken as a matter of course that it will be maintained by the senate. It is conceded generally to be one of the most important features of the naval bill looking toward real preparedness. While it was recommended by Secretary of the Navy, Josephus Daniels, the idea is understood to have originated with Thomas A. Edison, chairman of the naval consulting board.

It is designed to make possible the standardization of war materials, so that they can be produced quickly by private and government manufacturing concerns. Mr. Edison has made the remarkable statement that he believes that such a laboratory, as planned by him, can build a submarine engine in 100 hours. He thinks a complete submarine can be built in 15 days by furnishing the proper patterns, jigs, gages and other special appliances, to manufacturers, who would employ any number of men required, working in as many shifts as would be necessary. It is expected that the laboratory will furnish a most refreshing example of what scientists, engineers, manufacturers and labor can do to develop preparedness for America. The shortcomings of England at the beginning of the war, when she awoke to the necessity of industrial mobilization, aroused the experts of this country to the necessity of having ready all of the elements required for the co-ordination of all industrial, commercial and financial activities which could be quickly employed for the national defense. How far these desirable ends would be met is a question. There are obstacles in the way, as have been pointed out. Among them are absurd projects for government manufacture of armor plate, projectiles, and other materials, which can be furnished more readily by private plants, with both the quantity and quality assured. The plan for the laboratory, however, apparently has not been questioned from any point as to its feasibility.

The laboratory, it is said, will develop to the highest pitch of quality all the materials it will work upon and standardize, so that they may be manufactured by both private and government plants. Development of war units which have never been the object for adequate specialization in this country will be one great purpose of the laboratory. Included among these are aeroplanes and submarine engines, and other extremely important equipment.

It is proposed that the buildings of the laboratory will all be concrete, just like a modern manufacturing building. It is Mr. Edison's idea that a whole lot of money should not be spent for a vast number of things, but that the government ought to get the perfected unit and the gages and make arrangements with different shops so that on telegraphic notice materials can be obtained quickly.

"As long as you have arranged with thousands of shops and you have your gages, you do not need to store up anything and make a large investment," Mr. Edison told the house committee on naval affairs, "when you know that in 24 hours they can commence to ship it to you as fast as you can use it. The same way with munitions. I have a chemical laboratory here (indicating a drawing) for experimenting on munitions. There is no need of having a big store of munitions; just put the works up in different parts of the country, test them, and then grease them up for future use. They do not cost much. In the laboratory here are the different tools. These are all standard tools, but no tool there is a manufacturing tool, in so much as it has all the things on it to make almost any motion—to drill a hole in any position; all this is universal machinery, and if we get a job, we can do it; you cannot stick us."

Mr. Edison laid stress on the fact that the laboratory will have at its command the advice of the 30,000 engineers from the five great engineering societies of the country, who are giving their service to the government free. In Mr. Edison's words, they are doing it for patriotic reasons, and for glory, not money. Mr. Edison was of the opinion that good men could be secured to work in the laboratory, but admitted that as private concerns paid high for such services, the government would have to do likewise.

Howard E. Coffin, vice president of the Hudson Motor Car Co., Detroit, and a member of the naval consulting board, spoke of the vast potentialities of the industrial resources of this country, both physical and mental, to show what America could do, if proper preparation were made. He said that if Germany and France or England are taken together, they might equal the ability of this country in production, "but certainly not our ability to move fast in the manufacturing line, when we once get going, for we have certainly moved faster than they in almost every line of industry."

Dr. L. H. Baekeland, another member of the consulting board, insisted that in all matters of preparedness chemistry plays an ever increasing role. He said that if it were not for the chemists of Germany, the European war would have come to an end long ago. The United States, it was asserted, has as many highly educated and skilled chemists in proportion to its population as Germany, but that this country never became aware of the fact until it got short of aniline dyes. There are 10,000 chemists, he said, in this country, 7,600 of whom belong to the American Chemical Society, a membership as big as that of the German Chemical Society and the English Chemical Society combined, "and very probably the French Chemical Society thrown in," said Dr. Baekeland. He said, if chemists of Germany have specialized in aniline dye manufacturing, this country at least can refer to special chemical industries where not only its chemists are the leaders, but also the pioneers. These industries, said Dr. Baekeland, are so important in comparison with the aniline dye industry that it would be almost absurd to try to make such a comparison. "The amount of analine dyes im-

ported into this country," he continued, "amounted to the relatively small sum of $9,000,000 a year, which is a very trifling amount if you compare that to the production of sulphuric acid, to the production of aluminum, to the production of electrolytic soda, to the production of alloys, the carbides, cellulose, abrasives, and other chemical industries, essentially American specialties."

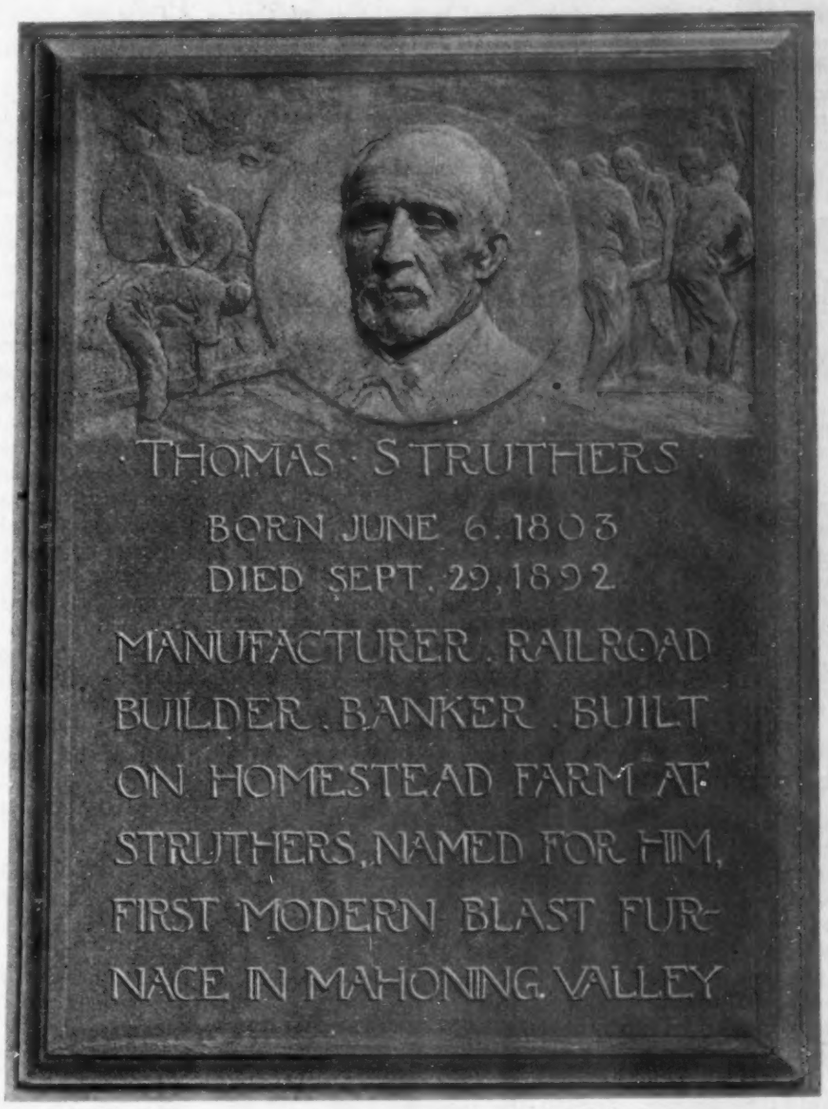
Turning to the question of making nitric acid, he said this country would have to make its own if it went to war, not in the most efficient way, but in the most expedient way; that is to say, by a method which could be improvised quickly and carried out regardless of cost. That, he said, is exactly what Germany did. Germany, it was said, is making nitric acid now regardless of cost.

"The best method for this country," said Dr. Baekeland, "would be first of all to commandeer all the ammonia manufactured in this country, and then by a process of oxidation —to which chemists have given considerable attention, but which we would like to study more in that laboratory—this ammonia can be converted into nitric acid. Then we would have to install in different parts of the country cyanamide plants for the fixation of the nitrogen of the air so as to supply us with more ammonia.

The cyanamide process of fixation is a very simple process. The first step in the process was invented, again in the United States, by an American chemist."

Tablet in Memory of Thomas Struthers

A SPLENDID bas-relief tablet of Thomas Struthers, who built the first modern blast furnace in the Mahoning valley on the Struthers family homestead at Struthers, O., has been prepared for installation in the National McKinley Birthplace Memorial building at Niles, O., which is well along toward completion. The first old-fashioned charcoal blast furnace west of the Allegheny mountains was built on this identical site in 1806 by John Struthers, father of Thomas Struthers, and by Robert Montgomery. So that the name of Struthers is linked indissolubly with the inception and development of the blast furnace industry of eastern Ohio. It is peculiarly appropriate, therefore, that a commemorative tablet of Thomas Struthers should be placed in the memorial planned to perpetuate the fame of William McKinley, to whose staunch advocacy of protective tariff principle, the people of the Mahoning valley ascribe the rise of their great iron and steel industry. Thomas Struthers was born June 6, 1803, in Trumbull county, or in that portion of it now included in the formation of the later Mahoning county. He died Sept. 29, 1892. The original Struthers charcoal furnace on Yellow Creek failed and John Struthers lost his fortune and his farm upon which the furnace was built. Thomas Struthers founded and for many years was active in Struthers, Wells & Co., with shops at Warren, Pa., building foundries and machine shops, and this firm still is in successful operation. He financed and was interested largely in the Oil Creek railroad from Oil City to Corry, Pa. He was interested in the coal mining business of the Mahoning valley. He was a banker, being president of the Corry National bank and the First National bank, Warren, Pa.


THOMAS · STRUTHERS ·
BORN JUNE 6. 1803
DIED SEPT. 29, 1892
MANUFACTURER . RAILROAD
BUILDER . BANKER . BUILT
ON HOMESTEAD FARM AT
STRUTHERS, NAMED FOR HIM,
FIRST MODERN BLAST FUR-
NACE IN MAHONING VALLEY

News of Employers and Employes

General Strike Among Ship Yards of Country May Be Declared—Cleveland Strikers Fail to Have Demands Granted

GENERAL strike among the ship yards of the country which, if it develops, will have a serious bearing upon the tremendous amount of work now under construction is threatened in the near future, according to *The Journal of Commerce*, of New York. It is stated that the wage question at the moment is a dominating factor among the ship yards on both the Atlantic and Pacific coasts and that one Atlantic yard now is refusing to contract for new construction because of labor uncertainty. A strike now is under way at the plant of the New York Ship Building Co., Camden, N. J., in which the dispute concerns the hours of work rather than wages. Another large Atlantic coast company recently settled a strike which had delayed work on contracts from 30 to 40 days. Two increases of 10 per cent each have been granted to the workers by this particular company. Union organizers, it is understood, have been at work among the ship yard employes who in the past have not been affiliated with any union. It is stated that since the war the average wages in ship yards have been increased about 40 per cent, as the supply of men suited to this work has been scarce in view of the tremendous demand.

The Journal of Commerce quotes an authority to the effect that ship yards have been taking contracts for 10,000-ton vessels on the basis of about $135 per ton, and for 5,000-ton vessels at about $150 per ton. A company which granted its men a 20 per cent increase states that this had added about $15 per ton to the cost of building a 5,000-ton ship.

Grants Wage Increase

Montreal, Que., June 13.—A vountary increase of 10 per cent in the wages paid to all workers in both the steel and coal departments of the Dominion Steel Corporation has been announced. In the case of the steel workers the full 10 per cent increase goes into effect immediately; and the coal workers receive a 6 per cent increase now, with 4 per cent increase to follow on Jan. 1, 1917. One of the important features of the increase granted to coal workers is that concurrently a new contract is entered into between the company and the men, to hold good for two years, from Jan. 1 next. The old contract will have expired at the end of the current year. Under the new arrangement, the old contract is abrogated and an interim 6 per cent increase granted until the full 10 per cent increase in wages goes into effect at the first of next year.

Premium Payments

The Stanley Rule & Level Co., New Britain, Conn., has adopted a plan of premium payments to deserving employes whereby extra wages averaging from 5 to 10 per cent of their earnings will be paid at the discretion of the superintendent. The plan is different from any established in that city since heads of manufacturing concerns decided to install the bonus system. It is intended to encourage men to remain with the company and to attract good men to work at the factory.

Statler Benefit Plan

Employes of the Hotels Statler at Buffalo, Cleveland and Detroit, on June 10, received certificates guaranteeing to each that in the event of his death the company will pay to his family or any beneficiary he may name the amount of his salary for one full year. Employes who begin work at later dates will receive similar certificates. This employes' benefit plan is the Hotels Statler's own from beginning to end, no insurance being bought from outside companies, as is the custom with some group insurance plans. The only condition is that the name shall be on the payroll. The employe gets the benefit of the plan automatically and the only thing the employe has to do is to give the company the name of the person whom he wants to name as beneficiary. Full information will be furnished to anyone interested by Fuller & Smith, Cleveland.

They Like Daylight

Milwaukee, Wis., June 13.—The Milwaukee harvester works of the International Harvester Co. has recognized the request of its 2,250 employes in the various departments that they be permitted to start work an hour earlier each day and thus be released one hour earlier each evening. The men now start work at 7 o'clock a. m. and work until 4:30 o'clock. They work nine hours as formerly, but gain an hour of daylight. The movement is the result of general agitation in Milwaukee for "setting the clock forward". While it is not expected that there will be a general movement in that direction, it is known that individual employers will generally give permission for an earlier start of work if it appears that the large majority of employes desire it.

Propose Employment of Women

Toronto, June 13. — The Munitions Section of the Canadian Manufacturers' Association has sent out a circular to those engaged in the manufacture of shells suggesting that women should be employed in this work in order to reduce the cost. The circular states that there is evidence that in some cases Canadian contractors are able to produce on a basis that is very close to the British costs and that several large and small producers are able to make a fair profit at the minimum prices now established by the Munitions board for renewal orders. British costs have been reduced through the employment of women on munition work of all kinds. Women are used almost exclusively on small shells and do some of the work on 6-inch shells.

No women are so employed in shell-making in Toronto, but a number are employed in assembling the parts and packing them for shipment and in making fuses.

Bonus for Faithful

Landers, Frary & Clark Co., New Britain, Conn., has worked out a plan whereby all the employes of the factory are to receive a bonus as a reward for faithfulness in work. The plan, which went into effect last week, will greatly benefit all the factories if they operate. Although no official information can be received, it is said by employes that the plan is as follows: If an employe works the required number of hours for two weeks, 5 per cent of his two weeks' earnings will be presented him besides the reg-

ular pay. If the employe is tardy in arriving at work, if he stays away from work, even half a day, he immediately loses the chance for the bonus until the next two weeks start.

Tents for Employes

The Bristol Brass Co., Bristol, Conn., has solved the problem of housing its employes a good part of the year by erecting 22 tents where they live in camp style when not at work. The tented city, so-called, is on King street, and is attracting much attention. It grows in size every week and as fast as one crowd leaves there is another to take its place. The tents accommodate four men each and are of the same size. The largest tent is used as a restaurant, and this method of living reminds one of the big circuses.

The tent suggestion came only after all means of taking care of the men that were to come for employment in the new plant of the company had been tried. All of the boarding houses and hotels were filled to their capacity and were turning people away, such was the congestion in Bristol a few weeks ago. The plan is working well.

Strike Broken

Cleveland, June 13.—The strike at the plant of the Variety Iron Works Co. has been practically broken. The men demanded an eight-hour day, recognition of the union and excessive overtime wages. None of the demands were granted About half of the men who have been out for over three weeks returned to work Monday morning. The strike was handled by the National Metal Trades Association.

New England Troubles

The latest strike of employes of the Fisk Rubber Co., Chicopee Falls, Mass., has been settled temporarily, but will be renewed again June 17, if the company does not complete the adjustment of its wage schedule by that time. The men have voted to call a general strike of the 2,400 employes on that date unless the company does as they wish.

The strike of about 50 employes of the Griffin Car Wheel Co., Chelsea, Mass., has been settled after a conference, at which concessions were made by both sides, and the men have returned to work.

The striking employes of the American Wringer Co., Woonsocket, R. I., have voted to reaffirm their former demands for a 15 per cent increase and a 54-hour week. The company has offered a bonus system with a guarantee of at least a 10 per cent increase, which the men declined, as they also did the subject of arbitration.

Graton & Knight Mfg. Co., Worcester, Mass., has increased the pay of its 1,600 employes 10 per cent effective June 1.

The Massachusetts state board of conciliation and arbitration has granted a certificate of normality to Sleeper & Hartley, Inc., Worcester, Mass., against whom a strike was declared by the machinists' union in April.

A Growing Association

The annual meeting of the Manufacturers' Association of Hartford County, Conn., was held at the Allyn House, Hartford, the night of June 5. Fourteen New England members of the National Metal Trades Association were guests. The following officers were elected for the ensuing year:

President—Charles L. Taylor, of the Taylor & Fenn Co., Hartford.

First Vice President—Charles B. Whittlesey, president of the Hartford Rubber Works Co.

Second Vice President—Edward B. Hatch, of the Johns-Pratt Co., Hartford.

Treasurer—Charles T. Treadway, of the New Departure Mfg. Co., Bristol.

Manager—Thomas J. Kelley.

Board of Managers—P. B. Gale, Hartford, Machine Screw Co.; R. H. Schutz, Sigourney Tool Co.; C. E. Whittier, the Whitney Mfg. Co.; C. L. Taylor, Taylor & Fenn Co.; C. D. Rice, Underwood Typewriter Co.; B. M. W. Hanson, Pratt & Whitney Co.; J. M. Merrow, Merrow Machine Co.; E. B. Hatch, Johns-Pratt Co.; George Pope, Pope Mfg. Co.; F. C. Billings, Billings & Spencer Co.; C. B. Whittlesey, Hartford Rubber Works Co.; F. W. Stickle, Capitol Foundry Co.; D. M. Wright, Henry & Wright Co.; Charles T. Treadway, New Departure Mfg. Co.; Robert S. Brown, New Britain Machine Co. Additional members of the board of managers, under the constitutional amendment passed before the election, were elected as follows: Carlyle H. Baldwin, of the American Hardware Corp., New Britain; E. Allen Moore, of the Stanley Works, New Britain; Joseph F. Lamb, of Landers, Frary & Clark Co., New Britain; Howard Cheney, of Cheney Bros., South Manchester.

The annual report of T. J. Kelley, of the association, showed an increase of from 79 to 101 companies during the year. These represent 50,000 employes, making the association one of the largest county manufacturers' associations in the United States. As one result of the increase in size, a branch employment bureau and clearing house will be established in New Britain immediately. This will cover New Britain and adjoining towns. The number of employes in the county has increased about 5,000 during the year.

Veterans Organize

More than 150 employes of the Crane Co.'s plant in Bridgeport, Conn., who have been with the company 25 years continuously, are forming a Veterans' association with the approval of the company officials. The Crane Co. will present each of the members with a gold service badge, and for every five years' service hereafter, they will receive gold bars to attach to the badge.

The Chicago plant of the company has an association with 300 members.

Labor Notes

The Donovan Wire & Iron Co., Toledo, has announced a new scale of wages and hours. The 150 men in the shop who had been working 10 hours a day will have a nine-hour day with wages for 10 hours, or practically a 10 per cent increase in wages.

Worcester Pressed Steel Co., Worcester, Mass., has presented each of its 225 employes who was on the pay roll Jan. 1, a certificate of life insurance for $500, payable at death, should death occur at any time during the service of the employe with the company. By special arrangement the certificates increase automatically $100 for each year of continuous service, until a maximum of $1,000 is reached. This insurance is without expense to the employe, all the premiums being paid by the company.

The first joint outing of the Worcester, Mass., branch of the National Metal Trades Association and the Employers' Association of Worcester county, Mass., was at the home of Robert D. Gould, president of the Bath Grinder Co., Fitchburg, Mass., at Whalom lake, Leominster, Mass., Tuesday, having been postponed from June 9. Guests were present from metal trade branches in Providence, R. I., Boston, Springfield, Mass., and Hartford, Conn. About 150 participated in the outing, which included an out-door lunch and sports.

The St. Louis Refractories Co., St. Louis, is remodeling its entire plant and will be turning out silica brick and brick shapes of all kinds shortly, in addition to its present product.

Tool Market Maintains Steady Gait

Inquiry for Mill Equipment Occupies Pittsburgh Builders—Railroad Lists and Additional Tools for Munition Makers Buoy Eastern Market

A LARGE volume of business continues to feature the eastern machine tool market. Most of this is in small lots, for shops representing practically all lines of industry. Railroad buying has improved materially. The Baltimore & Ohio and a few other eastern roads have placed additional fair-sized requirements and eastern houses have shared extensively in the lists distributed during the past week by the Chicago & Northwestern and the Michigan Central. The Grand Trunk railroad, which recently at its Montreal office took bids on a list of 41 large machine shop units, has not yet closed and it now is considered that this business will be delayed indefinitely and that possibly a new inquiry may be put out later. The Pennsylvania Ship Building Co., Pennsylvania building, Philadelphia, has started to place the machinery for the new ship building plant it is erecting at Gloucester, N. J. Early action is expected on the large requirements of the Sun Ship Building Co., Philadelphia, in connection with the new plant it is erecting at Chester, Pa. Among the largest prospective buyers in the east is the General Electric Co., which is about to make large extensions to its manufacturing capacity at Schenectady, N. Y., and Erie, Pa. The specifications for the machine tool equipment for the additions now are being prepared and the trade expects to have an opportunity to submit bids in the near future. The Milton Mfg. Co., Milton, Pa., which recently took a large shell contract, is taking bids on some additional shell-making equipment. Export business continues of comparatively small proportions. Although no definite announcement has been received, the trade generally understands that the Russian government has taken action to control the purchase of machine tools and other supplies in somewhat the same manner as effected by Great Britain last December, when the latter country took steps to make it impossible for speculators and irresponsible parties to import machine tools. Machine tool houses say that of late it has been becoming more difficult to secure payment for shipment to Russia, due to the more careful scrutiny to which Russian government officials now are subjecting all Russian import business. Deliveries on the general run of machine tools now are becoming more available for the immediate and nearby future. Among the lines which are most sold up are cylindrical grinders and milling machines. Automatic lathes and turret lathes no longer are so hard to get for nearby shipment. One lot of turret lathes was offered this week for immediate shipment. Prices on machine tools have undergone no further revision during the past month.

The Louis Sacks Iron Foundry, Newark, N. J., is about to build an addition. A. B. & J. Rathbone, Palmer, Mass., have let the contract for a wire mill addition. The Eagle Lock Co. will build a large addition to its plant at Plymouth, Mass. The Ferguson Steel & Iron Co., Buffalo, has completed plans for a large addition. The National Pneumatic Action Co., 556 West Twenty-second street, New York, will build a large plant at Avenel, N. J. The Standard Nut & Bolt Co., Valley Falls, R. I., is building an addition. The Buffalo & Lake Erie Traction Co. will build car shops at Lackawanna, N. Y. Gould & Eberhardt, Newark, N. J., will let the structural contract for a large new plant at Irvington, N. J. The Taylor Instrument Co., Rochester, N. Y., has let the structural contract for an addition. The Leeds & Northrup Co., Philadelphia, pyrometers, will build a large addition. Taylor & Wingert, Hagerstown, Md., will build a large metal-stamping plant to cost about $100,000. The Raritan Copper Works, Perth Amboy, N. J., is about to extend its machine shop. The Pringle Electric Mfg. Co., Philadelphia, has let the structural contract for a large extension. A. H. Wells & Co., Waterbury, Conn., have let the contract for a large tube mill. The structural contract for the large rolling mill and a melting plant for the Ludlum Steel Co., Watervliet, N. Y., finally has been awarded. The Atlantic Smelting & Refining Co., Brooklyn, is about to enlarge its capacity.

Chicago Market Stirring to Life

WHILE no large inquiries for machine tools have developed in the Chicago district, the total volume of actual business is of satisfactory proportions. The temporary lull noted a week ago seems to have largely disappeared. The lists issued by the railroads continue to be an important factor in the local field, although there is a feeling of hesitation on the part of some of the carriers. The Burlington took a few tools on a list which it recently published, but no further business from that source is expected. The Chicago & Northwestern and its associate lines have purchased the larger part of the equipment which was recently listed. The Chicago, Rock Island & Pacific has put out an inquiry for some small equipment, including a bolt cutter.

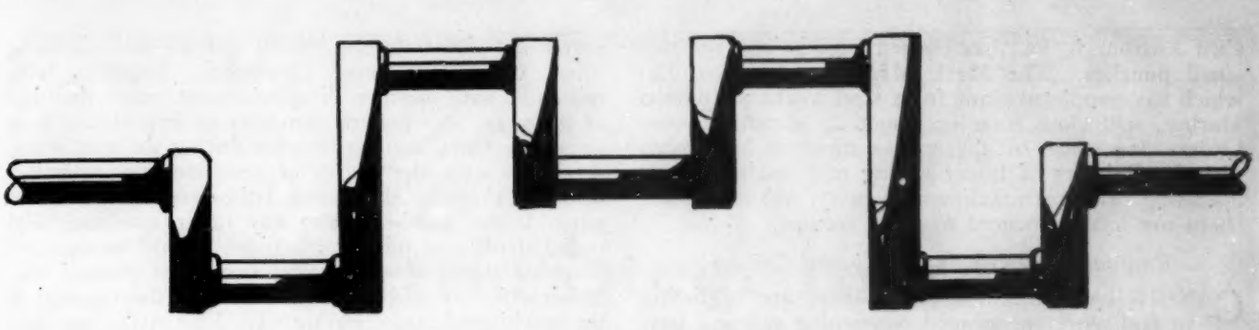
An inquiry is current for 100 special tools for the Russian government. The machines will be used for the manufacture of side arms. This list is being handled through independent brokers and includes 25 horizontal milling machines, 10 universal milling machines, five plain milling machines and 60 boring machines suitable for work on revolvers. Since little of this equipment is handled by Chicago dealers, the business will likely be placed in another city.

Cleveland Market Moderately Busy

THERE are no startling inquiries in the Cleveland machine tool market. Notwithstanding this fact, the volume of business concluded last week was of average proportions. Grinders, milling machines, cylindrical grinders and boring mills find a ready market when dealers have these tools in stock. One local dealer has contracted for certain types of machines for 1917 delivery, and the general attitude of the dealers is that present conditions will obtain.

Mill Equipment Enlivens Pittsburgh Market

MACHINE tool dealers in Pittsburgh do not find demand nearly so heavy as it was a few months ago. Manufacturers of war material in western Pennsylvania are not figuring in the market and no large inquiries are under consideration. Demand for electrically operated drills, grinders and presses is heavy and a number of inquiries are pending for shears and punches. The Westinghouse Electric & Mfg. Co.,



The Crank Shaft of an Automobile

is a very important part of the machine. If it breaks there is lots of trouble for the owner—and fewer sales for the manufacturer.

Manufacturers who wish to insure themselves against the breakage of *crankshafts, drive shafts, axles, connecting rods, transmission gears,* etc., are making these parts of "AGATHON" STEELS—and that's why their machines are meeting with great success.

"AGATHON" STEELS are produced in one of the most modern and up-to-the-minute steel plants in the world, every step in the numerous processes being overseen by highly efficient specialists.

It will pay YOU to give "AGATHON" a trial.

AGATHON STEELS

"AGATHON" Special Analyses
"AGATHON" Vanadium
"AGATHON" Silico-Manganese
"AGATHON" High Carbon
"AGATHON" Chrome Nickel
"AGATHON" Chrome Steel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steel

THE CENTRAL STEEL COMPANY
MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Building, F. Walter Guibert, District Representative
Cleveland Office: Hickox Building, The Hamill-Hickox Co., District Representative
Chicago Office: Room 1511-12 Lytton Bldg., 14 East Jackson Blvd.,
A. Schaeffer, District Representative

East Pittsburgh, Pa., has opened negotiations for two small punches. The Mark Mfg. Co., Chicago, Ill., which has completed plans for a steel works at Indiana Harbor, will close soon on about 25 electric cranes. Orders for some of the mill equipment have been placed. Builders of heavy rolling mill machinery are operating plants at maximum capacity, although some shops are inconvenienced by labor trouble.

Railroads Encouraging Cincinnati Dealers

CINCINNATI machine tool makers are beginning to feel more encouraged concerning railroad buying. The Big Four system is out for a small list for its various shops, and the Chesapeake & Ohio has not purchased all of the equipment for its new shops at Silver Grove, Ky., near Cincinnati. Inquiries from railroads have been a disappointment since the first of the year. No general inquiries of importance have come into the Cincinnati market during the past week. A review of order books of machine tool manufacturers in that city shows that lathes are being made in much larger numbers than any other machine, with radial drills and milling machines second in demand. Machine shops are gradually reaching a normal condition after the slight delay caused by the renewal of the machinists' strike on May 1. This strike has been under the control of the employers for a number of weeks.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

FORT FAIRFIELD, ME. — Surveys are under way for an electric road from Fort Fairfield to Limestone, about 64 miles, to include a steel and concrete bridge about 500 feet long over the Aroostock river at Fort Fairfield.

ROCKLAND, ME. — The Maine Central Railroad Co. will build a brick and stone passenger station to cost $100,000 on the site bounded by Union, Pleasant, Portland and Brick streets.

WESTFIELD, ME.—The Westfield Electric Co. has been incorporated to do electric lighting and operate a power plant. The new company is capitalized at $10,000 by Royal J. Colbath, Horace A. Anderson, Mars Hill, and Aubrey C. Frost, Limestone.

RUTLAND, VT.—The Howe Scale Co. is having plans prepared for a brick and steel addition to its works.

BOSTON.—The plant of the Union Steel Castings Co., Jamaica Plains, was damaged by fire with a loss of $50,000.

BOSTON.—The Muslar Machinery Co. has been incorporated with $50,000 capital by N. Muslar, C. J. Ouellet and C. O'Hara.

BOSTON.—The Yale Plating & Mfg. Co. has been incorporated with $5,000 capital by E. P. Cohen, president; Maurice Cohen, treasurer, and J. Levy.

BOSTON. — The Basle-Adams Engineering Co. has been incorporated with $10,000 capital by Charles L. Basle, president, Porter H. Adams, Brookline, treasurer, and S. C. Brackett.

BOSTON.—The North End Union will build a brick and stone, 4-story and basement, community building at 20 Parmenter street. It will be 48 x 72 feet with an ell, 29 x 30 feet.

BROCKTON, MASS.—The Brockton-Rand Co. has let the structural contract for a 4-story, 35 x 206-foot addition.

CAMBRIDGE, MASS. — Bids closed this week for a reinforced concrete, 4-story and basement, 65 x 322-foot factory for the Boston Woven Hose & Rubber Co. on Fulton street.

CHICOPEE FALLS, MASS. — The Exchange Realty Trust, Springfield, will build a brick, 4-story, 45 x 97-foot block at Cochran and Muzzy streets.

LEOMINSTER, MASS.—Rowley & Shaw have awarded a contract for a mill-construction, 2-story, 30 x 60-foot factory near Pleasant street.

LYNN, MASS.—The General Electric Co. will erect four buildings at its plant in Lynn. Three will be used for manufacturing purposes and one for dispensary purposes.

NEW BEDFORD, MASS. — The Beacon Mfg. Co. will build a transformer house at its plant.

NORTH CHELMSFORD, MASS. — The Lowell Textile Co. will build a brick, mill-construction, 2-story, 100 x 370-foot addition to its plant.

PLYMOUTH, MASS.—The Eagle Lock Co. will build a 6-story and basement, 68 x 252-foot addition at Plymouth.

QUINCY, MASS.—The Fore River Ship Building Corporation has awarded a contract to Westinghouse, Church, Kerr & Co., New York, for the addition of a brick, 2-story, 60 x 400-foot pattern and joiner shop to its plant.

REVERE, MASS.—The New England Telephone & Telegraph Co. is building a brick, fireproof, 2-story and basement, 51 x 53-foot, telephone building to cost $30,000 on Winthrop street.

SOMERVILLE, MASS. — The Somerville Iron Foundry Co. has been incorporated with $50,000 capital by Nathan H. Reed, president; Nathan P. Reed, treasurer, and M. D. Bingham.

SPRINGFIELD, MASS. — The Arrow Co. has been incorporated to manufacture motors, etc. The new concern is capitalized at $25,000 by I. H. Page, G. A. MacDonald and C. R. Culver.

WORCESTER, MASS. — The Graton & Knight Mfg. Co. will build a brick, 4-story, 63 x 78-foot addition to its plant.

WORCESTER, MASS. — The Norton Co. has awarded contracts to the Standard Plunger Elevator Co. for seven elevators to be installed in the additions to its plants in Greendale. The cost will be $19,400.

AUBURN, R. I.—The United Wire & Supply Co. will build a large factory on a 6-acre site just acquired on Elmwood avenue.

PROVIDENCE, R. I.—The American Emery Wheel Works will build a brick, 3-story, crusher building at its plant.

PROVIDENCE, R. I.—Harry Priest will build a concrete block, mill-construction, 3-story, 40 x 60-foot storage building on Printery street.

PROVIDENCE, R. I.—The Atlas Machinery Co. has been incorporated with $30,000 capital by Volney P. Kinne and Charles A. Cunningham, both of Buffalo, and B. W. White, Cranston, R. I.

BRIDGEPORT, CONN.—Plans are being figured for a brick, mill-construction, 2-story and basement, 82 x 90-foot factory, on Riparian street, to cost $30,000 for Henrietta M. Noble and F. S. DePuy.

ROCKVILLE, CONN.—A. L. Martin will rebuild the factory recently damaged by fire. The new structure will be larger and will be equipped with special machinery which has been ordered.

STRATFORD, CONN. — The Bridgeport Steel Treating Co. has been incorporated with $50,000 capital by W. J. Bantley, F. R. Barron, both of Bridgeport, Matthew Corbett and Matthew Corbett Jr., both of South Norwalk, Conn.

WATERBURY, CONN.—The Metal Specialty Mfg. Co. is having plans figured for a brick and steel, 1-story, 98 x 170-foot factory at Brown's farms.

WATERBURY, CONN.—Plans are being prepared for a brick and steel, 3-story, 75 x 150-foot factory on Crane street for the American Brass Co.

WATERBURY, CONN.—A. H. Wells & Co. have let a contract for erecting a 1-story, 101 x 161-foot, tube mill, a 25 x 30-foot, boiler house, a coal pocket and a railroad trestle.

WEST HARTFORD, CONN.—Bids have closed for a brick and steel, 1-story, 50 x 124-foot addition to the factory a 40 x 50-foot, boiler house and a 12 x 24-foot, switchboard room for the Elmwood plant of the Abbott Ball Co.

Electric Steel Ingots

500 Tons Per Month

DELIVERIES BEGINNING IMMEDIATELY

We have just completed and placed in operation a

New Electric Steel Plant

the output of which has not yet been contracted for. This is your opportunity to close for your immediate requirements of high grade ELECTRIC STEEL INGOTS or

Annealed Electric Steel Castings

Capacity 300 TONS Per Month

Our plant is equipped with a three-ton HEROULT ELECTRIC FURNACE, which is ample insurance of the highest quality steel. Our electric steel plant is the outgrowth of our crucible steel casting business which we have conducted successfully for many years, while our trained organization has had a wide experience in steel casting manufacture.

Alloy Steel Ingots or Castings
Made to Specifications

Racine Steel Castings Co. RACINE, WIS.

Owned and operated by the

Belle City Malleable Iron Co., Racine, Wis.

From the Alleghenies to the Sea

BROOKLYN, N. Y.—Chas. Olsen, architect, 1762 Sixty-ninth street, is about to let a contract for erecting a 2-story, 50 x 100-foot machine shop for Peter Reiley.

BROOKLYN, N. Y.—The Doehler Die Casting Co., Court and Ninth streets, has let a contract to the Standard Gas Power Co., 17 Battery place, New York, for erecting a 1-story, 22 x 100-foot, power plant.

BROOKLYN, N. Y.—Wm. J. Conway, architect, 400 Union street, is about to let the structural contract for a 2-story and basement, 40 x 100-foot addition to be erected for the Atlantic Smelting & Refining Co., 749 Hicks street, at a cost of $25,000.

BUFFALO.—The Ferguson Steel & Iron Co. has completed plans for a 1-story, 40 x 140-foot building.

BUFFALO.—The Buffalo & Lake Erie Traction Co. has let a contract for the erection of car shops at Lackawanna, N. Y.

NEW YORK.—The Acieral Co. of America has been incorporated to manufacture tools, etc. The new concern is capitalized at $150,000 by O. H. Fuerth, A. Delavandeyra and W. B. Fewell.

NEW YORK.—The American Hard Rubber Co., 11 Mercer street, is having plans prepared by Walter Kidde, 90 West street, for a 3-story, 52 x 207-foot plant to be erected at College Point, L. I.

NEW YORK. — The Bennett Machinery Co. has been incorporated to manufacture lathes, drills, milling machines, planers, etc. The new company is capitalized at $5,000 by M. C., and G. L. Bennett, 30 Church street.

NEW YORK.—Wm. Higginson, architect, 13 Park Row, is about to let a contract for the erection of a 1 and 6-story, 100 x 100-foot factory for McKesson & Robbins, manufacturing chemists, 90 Fulton street. The plant will cost $90,000.

SCHENECTADY, N. Y. — The General Electric Co. is receiving bids for erecting a 2-story, 180 x 200-foot addition to cost about $60,000.

SCHENECTADY, N. Y. — The General Electric Co. has let the structural contract for wire and cable plant No. 89, which will be a 1-story, 200 x 200-foot building.

UTICA, N. Y.—The Mohawk Valley Pipe & Foundry Co. has been incorporated with $300,000 capital by A. B. Maynard, J. Rothstein and J. A. Gunn.

WATERVLIET, N. Y. — Thornton W. Price, architect, Woolworth building, New York, has let a contract to the Samuel Austin & Son Co., Cleveland, for the erection of a 1-story, 41 x 300 and 70 x 360-foot rolling mill and melting department for the Ludlum Steel Co. at Watervliet.

BAYONNE, N. J.—The H. D. Best Co., 52 Vanderbilt avenue, New York, has been awarded a general contract for a factory group at Lincoln park, Bayonne, for the Vacuum Oil Co.'s new refining and storage center. The cost will be approximately $2,000,000. Sub-contracts awarded are: Babcock & Wilcox, boilers; Concrete Steel Co., reinforced concrete work; John Monks & Sons, piers; National Fireproofing Co., fireproofing and terra cotta, and David Lupton's Sons, steel sash.

IRVINGTON, N. J.—Gould & Eberhart, Newark, manufacturers of machine tools, will erect a large plant along the Lehigh Valley railroad at Irvington. Frank H. Smith, New York, is the engineer. The buildings will be brick with saw-tooth roofs.

NEWARK, N. J.—The Splitdorf Electric Co., 388 High street, has been granted a permit to erect a 4-story concrete building.

NEWARK, N. J.—The American Synthetic Dyes Co., 61 Broadway, New York, will build seven additional structures at its plant here.

NEWARK, N. J.—The J. E. Mergott Co., 316 Jelliff avenue, manufacturer of metal goods, has let a contract for erecting a brick extension, 14 x 81 and 27 x 51 feet, to its plant.

NEWARK, N. J.—F. H. Kroenigsberger, architect, 665 Broad street, is preparing plans for a 2-story, 20 x 150-foot plant to be erected at Newark for the National Pneumatic Action Co., of which E. G. Anderson, 556 West Twenty-second street, New York, is president.

PATERSON, N. J.—The Leslie & Elliott Co. has been incorporated to do plate and sheet metal work. The new concern is capitalized at $125,000 by David Leslie, William Elliott and W. H. Smith, Paterson, N. J.

PERTH AMBOY, N. J. — The Raritan Copper Works will build a 1-story, 48 x 48-foot machine shop extension. The company's engineer, Geo. L. Fulton, is drawing the plans.

PLAINFIELD, N. J.—The American Motor Co. has let a contract to John E. Dunn, 925 West Front street, for erecting a 60 x 400-foot main building and several smaller structures, to cost about $100,000.

TRENTON. — The Wagner-Hoyt Electric Co. has been incorporated to manufacture electric motors with a capital of $1,000,000. The incorporators are Harry H. Picking, Charles O. Geyer and Gordon Grand, East Orange.

BOYERTOWN, PA. — The Boyertown Burial Casket Co. will build a 4-story, 35 x 70-foot addition.

CHESTER, PA.—The board of education plans to build a high school and additions to two primary schools, to cost $500,000. Clyde S. Adams, 1233 Arch street, Philadelphia, is preparing the plans.

CONNELLSVILLE, PA. — The board of education plans to build a high school, to cost about $190,000. W. C. Eckles, Lawrence Saving & Trust building, New Castle, Pa., is preparing the plans.

GREENSBURG, PA.—R. A. Roberts, of the Roberts Fertilizer Co., announces that the company will erect a new building, two stories, 30 x 40 feet, and that the company will purchase $6,000 worth of machinery, including two rendering tanks, vacuum pumps, dryer, elevator, engine and boiler.

KITTANNING, PA. — George W. Reese, Water and Vine street, plans to build a 3-story, 58 x 100-foot, hotel, store and apartment building, to cost about $40,000. C. C. Clepper, Park building, Pittsburgh, is preparing the plans.

NEW BRIGHTON, PA.—The Beaver Refrigerator Co. plans to build a 1 and 2-story factory, to cost about $35,000.

NEW CASTLE, PA.—The Johnson-Bronze Co. plans to build an addition to its factory, to cost about $85,000. Prack & Perrine, Keystone building, Pittsburgh, are the engineers.

PHILADELPHIA.—The Ajax Metal Co. is about to erect a pattern shop which will be 4 stories, 30 x 100 feet, fireproof construction.

PHILADELPHIA.—The Leeds & Northrup Co., manufacturer of electrical instruments, will build a 2-story, 50 x 100-foot addition.

PHILADELPHIA. — The Eastern Sheet Metals Co. has been incorporated with $50,000 capital by John Mayer, Hazelton, Pa., and others.

PHILADELPHIA.—The Pringle Electric Mfg. Co., 1906 North Sixth street, has let a contract for erecting a 3-story, 25 x 85-foot addition to cost about $15,000.

PITTSBURGH.—The United States Rubber Co. plans to build an 8-story storeroom and warehouse.

PITTSBURGH. — The McClintic-Marshall Construction Co. has awarded a contract to the Sharon Steel Construction Co. for the erection of 200 tons of steel at its plant at Colonia, Pa.

PITTSBURGH.—The Penn Iron & Steel Co. has been incorporated to manufacture iron and steel. The new company is capitalized at $50,000 by P. A. Stuart, Cheswick, Pa., J. Milholland, 1015 Park building, Pittsburgh, and I. M. Ryan, Pittsburgh.

READING, PA.—Wm. H. Dechant & Son, engineers, Baer building, have completed plans for a 1-story, 60 x 220-foot addition to the steel foundry of the Reading Steel Casting Co.

TARENTUM, PA.—The Shoop Bronze Co. has been incorporated with $25,000 capital by E. V., G. A. Jr. and C. H. Shoop, O. B. Lindquist and W. F. Conklin.

DOVER, DEL.—The Tungsten Steel Co., Pittsburgh, has been incorporated with $600,000 capital by H. E. Latter, N. P. Coffin and C. M. Egner, all of Wilmington, Del.

BALTIMORE. — Dubos & Schlutter have been incorporated to manufacture machinery. The new company is capitalized at $10,000 by G. H. Schlutter, E. Dubos, and K. A. M. Schlotz.

BALTIMORE.—The Autogeneous Welding & Equipment Co. has been incorporated to manufacture machinery. The new company is capitalized at $50,000 by H. T. W. Heinmiller, E. F. Hoffman, E. Warner and M. N. Packard.

CURTIS BAY, MD. — The Curtis Bay Chemical Co. has let a contract for the construction of an addition to cost about $1,000,000. The company has an office at 27 William street, New York.

HAGERSTOWN, MD.—Taylor & Wingert, manufacturers of metal stampings, are planning to build a plant to cost about $100,000.

SPARROWS POINT, MD.—The Maryland Steel Co. has let the structural contract for a 1-story, 160 x 625-foot, fabricating building and mold loft. The company also has plans for a 1-story blacksmith shop.

WASHINGTON, D. C.—The bureau of yards and docks, navy department, will receive bids until July 1 for furnishing and installing a 100,000-pound capacity railroad track scale at the naval station, Pearl Harbor, Hawaii.

WASHINGTON, D. C. — The bureau of yards and docks, navy department, will receive bids until June 24 for two 350-horsepower boilers and a steel stack for the naval station, island of Guam. Specifications may be had on application to the bureau.

Activities in the Central States

AKRON, O. — The county commissioners will erect a concrete viaduct over the canal west of James street. The new structure will cost between $40,000 and $50,000.

AKRON, O.—The voters of the city of Akron will vote in August on the bond issue for the erection of the North Hill viaduct. The plans, prepared by Mr. Paul, county engineer, call for a structure to cost between $1,250,000 and $1,350,000.

BUCYRUS, O.—Geo. B. Hicks has been awarded a contract to erect a brick and steel, 55 x 150-foot, pattern storage building at the Bucyrus steel plant of the Ohio Foundries Co. Other buildings are planned by the company.

CANTON, O.—The Canton Feed & Milling Co. is erecting a power plant and a brick and concrete, 3-story, 78 x 198-foot building. The improvements will cost $40,000.

CANTON, O.—Geo. H. Whikey & Son have been awarded a general contract for erecting the galvanizing and black sheet plant for the Berger Mfg. Co. The Canton Bridge Co. has been awarded the contract for the steel. The entire improvement will cost $150,000.

CANTON, O.—W. I. Rohbock, chief engineer of the Wheeling & Lake Erie railroad, with offices in the Electric building, Cleveland, will let contracts in the near future for the $200,000 freight depot to be erected at Cherry avenue and the railroad tracks. The plans call for two buildings, one to be three stories, 40 x 336 feet, and the other to be two stories, 27 x 121 feet. Both buildings will be of reinforced concrete, fireproof construction.

CINCINNATI.—The Triumph Mfg. Co. will remodel its plant and build a new office building. Equipment for the manufacture of mixing machinery will be required.

CINCINNATI. — A bridge to cost $49,780 will be built over the Mill creek at Woodlawn, a suburb of Cincinnati. The new structure will be of reinforced concrete.

CINCINNATI. — The Cincinnati, Hamilton & Dayton railroad will build a bridge over the Springfield pike, at Hartwell, a suburb of Cincinnati, to cost $85,000. Four hundred tons of structural and reinforcing steel will be required.

CLEVELAND.—The American Auto Sheet Metal Co. has been incorporated with $25,000 capital by W. J. Mahon, D. Gobeille, W. W. Burke, W. J. Monaghan and N. McGiffin. The company does not expect to build. It is merely continuing an established business.

LIMA, O.—The Apex Skirt Co. has plans for a 2-story, 50 x 145-foot, brick factory to be erected Jackson street. A branch factory at Bluffton will be dismantled and the equipment moved to the new plant.

LIMA, O.—R. Winthrop Pratt, engineer, 708 Hippodrome building, Cleveland, will prepare plans for a filtration plant for the city of Lima. Mr. Pratt will also prepare plans for a similar plant for the city of Ravenna.

LORAIN, O.—The National Tube Co. will erect a power plant to utilize the gases from a battery of by-product coke ovens now being erected.

MARTINS FERRY, O.—Boyd & Brown, Martins Ferry, have been awarded a contract to erect a $10,000 exchange for the Bell Telephone Co. The building will be of brick and fireproof construction.

MASSILLON, O.—The Massillon Rolling Mill Co., the Central Steel Co., and the American Stamping & Enameling Co., which are subsidiary to the Geiger-Jones syndicate of Canton, O., will establish a $250,000 gas producing plant.

NEW PARIS, O.—Otto Hecthorn, county engineer, will prepare plans for about 20 bridges in the county. These bridges will be of concrete or steel I-beam construction.

SEBRING, O.—The Sebring Foundry Co. has been incorporated with $5,000 capital by W. D. Young, C. E. Libert, A. G. Davis, E. G. Beighey and W. Hilliard.

SPRINGFIELD, O.—The Blackwood Steel Foundry Co. has been incorporated with $450,000 capital by W. L. Parmenter, D. R. Carpenter, W. M. Scott, A. Wagner and P. H. Sheets.

Wanted---Machinery!

Here Are a Few of the Latest Calls for Equipment Made Public During the Past Week

B. C. Hodgson, Box 631, Knoxville, Tenn., is in the market for a small, revolving steam shovel on tractor wheels.

The Kentucky Electrical Co., Owensboro, Ky., is in the market for a small 4-spindle press to take not more than a 5/16-inch drill, a milling machine and a 24-inch lathe.

The city commissioners of Clarksdale, Miss., are in the market for a 500-kilowatt, alternating current turbo-generator with a direct-connected 125-volt exciter; also a 200-kilowatt, direct-connected engine and generator with a 125-volt exciter will be purchased.

The Adirondack Mining & Milling Co., Joplin, Mo., is in the market for a 150-horsepower, high-pressure boiler and a direct-connected, oil engine with an electric lighting generator.

The Crucible Steel Forge Co., Cleveland, O., wants a 40-inch, motor-driven, direct-connected engine lathe, 25 feet between centers.

M. Brennen & Son, Hamilton, Ont., are in the market for a 40 or 50-horsepower motor.

The American Foundry & Machine Co., Salt Lake City, Utah, is in the market for a 10-foot boring mill, a 42-inch, open-side planer and a 26-inch engine lathe with a 24 or 26-foot bed.

ST. MARYS, O.—The Boos Machine Co. has been incorporated with $50,000 capital by G. F., W. F. Boos, L. Stout, A. C. Beuhler and H. Bushman.

WARREN, O.—The Trumbull Steel Co. is constructing a 2-story, brick addition to its office building. The company will also erect a 100 x 200-foot, steel building for use in the cold rolled stripped steel department.

YOUNGSTOWN, O. — The Youngstown Sheet & Tube Co. has made an appropriation of $100,000 for the improvement of the blast furnaces of the company at Hubbard, O.

CLARKSBURG, W. VA.—The Monongahela Valley Traction Co., Fairmont, W. Va., has awarded E. Elford, Columbus, O., a contract to erect 3-story interurban station, 77 x 82 feet, to cost $70,000.

FAIRMONT, W. VA.—The Fairmont Hotel Co. plans to erect a steel frame hotel and store building.

HANDLEY, W. VA.—The Chesapeake & Ohio railroad, Richmond, Va., has awarded Major Bros. & Carpenter, Clifton Forge, Va., a contract to enlarge its roundhouse. F. I. Cabell is the chief engineer.

PARKERSBURG, W. VA. — A $40,000 bridge will be erected by the Kenawah Traction & Electric Co. and the county over the Boaz ravine below Williamstown.

ANDERSON, IND.—The Fulton Tractor Co. has taken over a plant which will be equipped to manufacture farm tractors and motors. This is a new company, organized with $300,000 capital.

CONNERSVILLE, IND.—W. W. Wainwright & Son, manufacturers of automobile parts, will build an addition.

EVANSVILLE, IND.—The Newton Kelsay Hame & Harness Co. will build a foundry addition to its plant.

FORT WAYNE, IND.—The Wayne Oil Tank & Pump Co. is increasing its capital stock from $500,000 to $700,000 and will build an addition, 400 feet long.

HAMMOND, IND. — A steel or concrete bridge will be built across the Grand Calumet river, at Calumet avenue.

INDIANAPOLIS, IND. — A contract for erecting a $25,000 addition to the plant of the Oakes Co., manufacturer of pressed steel parts for automobiles, was awarded to Charles J. Whacker, Indianapolis.

INDIANAPOLIS, IND.—The Veiox Spring Hub Co. has been incorporated with a capital of $30,000 to manufacture a patented spring hub. The incorporators are F. J. Veiox, Chas. Veiox, and Louis P. Kern.

INDIANAPOLIS, IND. — The Nu-Wa Pump Co. has been incorporated with a capitalization of $10,000 to manufacture machinery. The directors are Charles S. Shotwell, A. G. Miessen, and Edward H. Harris.

INDIANAPOLIS, IND. — P. J. Landers, superintendent of the Indianapolis Union Railway Co., announces that a $125,000 contract had been awarded to the Ketler-Elliott Erection Co., Chicago, for a part of the track elevation, steel work through the business district of Indianapolis. A total of 2,000 tons of steel will be delivered this month. The total amount of steel which will be required in the track elevation work is about 20,000 tons.

LAFAYETTE, IND. — The Ross Machine Co. is having plans prepared for a factory to be erected at Lafayette.

LAWRENCEBURG, IND. — Woodworking equipment will be needed by the O. B. Furniture Co., Indianapolis, which has purchased the plant of the James & Meyer Buggy Co.

MUNCIE, IND.—The Interstate Motor Co. is planning to build an addition to its plant.

MUNCIE, IND.—The T. W. Warner Co., manufacturer of automobile parts, will build an addition, 85 x 125 feet.

SOUTH BEND, IND.—The Stevenson Underwear Co. have plans for the addition of two mills, to be of reinforced concrete with steel sash. Contracts for machinery includ-

ing a 300-horsepower engine and generator have been awarded.

WESTPORT, IND.—Plans are being made by Charles Brossman, architect, Merchants' Bank building Indianapolis, for a municipal electric light plant, costing $5,000. T. W. Robinson is the city clerk.

CHICAGO.—Templeton, Kenly & Co., 1020 South Central avenue, manufacturers of railway supplies, are preparing to build an addition.

CHICAGO. — The Goldsmith Smelting & Refining Co., 29 West Madison street, will build a 2-story factory, 35 x 53 feet, to cost $18,000.

CHICAGO.—W. C. Griswold, 3616 Grand boulevard, will build a 2-story factory, costing $25,000, for the manufacture of drawn metal ware.

CHICAGO.—The Power Wheel Mfg. Co. has been incorporated with $10,000 capital by William H. McClellan, Albert Mracek and J. R. Emery, 2216 South Michigan avenue.

CHICAGO.—The Ko Shovel Stoking Co. has been incorporated to manufacture automatic stokers. The new company is capitalized at $5,000 by Fred and Fritz Goetz and George A. Kohout, 53 West Jackson boulevard.

CHICAGO HEIGHTS, ILL.—The Durand Steel Locker Co. will build an addition to its plant at a cost of $22,000.

JOLIET, ILL.—Plans are being considered for a bridge between Kankakee and Will counties. The proposed structure will be 680 feet long with 20-foot roadway and will require 200 tons of steel.

MOLINE, ILL.—The Western Structural Co. has been incorporated with $25,000 capital by Lawrence Roys, L. C. Roys and M. H. Rice.

QUINCY, ILL.—F. A. Bain will build a factory at Busknell, Ill., for the manufacture of automobile accessories.

ROCKFORD, ILL.—The Union Foundry & Machine Co. will build a 2-story foundry addition.

ALMA, MICH.—The Alma Standard Foundry Co. is to remove its plant to St. Louis, Mich., and will build a plant, 100 x 160 feet, at St. Louis.

DETROIT. — The Springfield Metal Body Co., Springfield, Mass., is planning to build a factory at Detroit.

DETROIT.—The Schoenborn Cowles Mfg. Co., manufacturer of brass specialties, is building a 2-story factory.

DETROIT.—The Gray Iron Foundry Co. has been incorporated with $15,000 capital by G. R. and E. M. Couls and C. L. Berus.

DETROIT.—The Wadsworth Mfg. Co. is having plans prepared by Louis Kamper, architect, 701 Fine Arts building, for a 2-story factory, 95 x 95 feet, to cost $60,000.

DETROIT.—The Michigan Copper & Brass Co. is building a 1-story factory, 72 x 83 feet, on Jefferson street, at a cost of $10,000.

DETROIT.—Joseph M. Smith & Co., E. L. Ackerman, president, manufacturer of automobile hardware, will build a 2-story factory at Dubois street and East Grand boulevard.

DETROIT.—The Motor Products Corporation, incorporated under the laws of the state of New York with $10,000,000 capital and including the Vanguard Mfg. Co., the Diamond Mfg. Co., the Universal Metal Co., Detroit, the Superior Mfg., Ann Arbor, Mich., and the Diamond Mfg., Walkerville, Ont., will build a large plant to replace the four plants now being used. W. C. Rands is president of the corporation.

FENTON, MICH.—The O. E. Williams Aeroplane Co. has been incorporated and will build a factory to manufacture air craft. The company is capitalized at $25,000, by O. E. Williams and others.

GRAND HAVEN, MICH.—The plant of the Johnston Bros. Boiler Works was damaged by fire with a loss of $150,000. The plant will be rebuilt at once.

HOLLAND, MICH.—The Home Furnace Co. will build a factory for manufacturing furnaces, and will require foundry machinery and sheet metal tools.

JACKSON, MICH.—The Argo Motor Co. has purchased a site and will build a new plant. Mansell Hackett is president and general manager.

KALAMAZOO, MICH. — The Kalamazoo Paper Co. is erecting a $400,000 coating plant and the Riverview Coated Paper Co. is erecting a $500,000 paper mill at Kalamazoo.

SAGINAW, MICH.—The Saginaw Motor Car Co. has been incorporated to manufacture automobiles and parts. The new concern is capitalized at $100,000 by Henry E. Oppenheimer, John A. Cimmerer and William C. Wiechmann.

FOND DU LAC, WIS.—The Fond du Lac Church Furniture Co., Oak street and Oak place, will erect a 3-story building, 95 x 135 feet. A considerable amount of wood and metalworking machinery will be required. William Mauthe is the president.

GREEN BAY, WIS. — The Hudson-Sharp Mfg. Co. is enlarging its plant and installing metal-working equipment, lathes, shapers, drills and planers. The capital stock has been increased to cover the additions.

KENOSHA, WIS. — The American Brass Co. will build additions to its plant in Kenosha, consisting of a brass foundry, 200 x 320 feet, an addition to the rolling mill, 225 x 320 feet and a new office building.

MADISON, WIS.—A contract will be let in August for a pumping station and new water supply, at a cost of $225,000. E. E. Parker is the city engineer.

MILWAUKEE. — The Riesen Bros. Co., general contractor, 612 Caswell block, is having plans prepared for a 9-story hotel costing $350,000 and an $87,000 apartment building to be erected at Minot, N. D.

MILWAUKEE. — A light manufacturing building costing about $15,000 will be erected for Milwaukee interests on Oregon street, under the direction of Charles J. Keller, architect, 521 Germania building.

MILWAUKEE.—The Electric Steel Castings Co. has started work on the erection of the first unit of its new $250,000 electric steel foundry at Sixty-fourth avenue and the Northwestern tracks, in West Allis. The foundry will be 80 x 500 feet, one story; the shop, 40 x 150 feet, two stories, and the power house, 40 x 90 feet. The general contract is in the hands of the Raulf Co., general contractor, Patton building.

SUPERIOR, WIS. — The Great Northern railroad has awarded a contract to W. F. Hill for enlarging the roundhouse and power plant at the terminal in Superior.

SOPERTON, WIS. — The Forest County Potash Co., Soperton, has been incorporated with $50,000 capital and will establish a large potash and by-products plant in Soperton. S. D. Switzer and H. E. McGraw are promoting the concern.

KANSAS CITY.—The Kansas City Terminal Railway Co. will build a viaduct on Holmes street, costing $135,000.

ST. LOUIS.—The Western Stamping Co. has been incorporated with $2,000 capital by V. H. Handschlug, A. Sabor and G. Eigel.

ST. LOUIS.—The Thomas H. Keppel Mfg. Co. has been incorporated with $100,000 capital by T. H. Keppel, J. M. Smith and J. B. Thomas.

WATERLOO, IA.—The Blackhawk Furnace Co. has been organized recently and will engage in the manufacture of steel furnaces.

MINNEAPOLIS.—The Berg Bros. Mfg. Co., manufacturer of sheet metal specialties, will build an addition to its factory.

ST. PAUL, MINN.—The H. Koppers Co., Pittsburgh, is erecting a by-product, coke and gas plant at St. Paul at a cost of about $2,000,000.

In the South and Around the Gulf

BREWTON, ALA.—Bids will be received until July 3 by the county commissioners for a 100-foot, low-truss bridge, 20 feet wide. W. E. Rushing is probate judge at Brewton.

HATTIESBURG, MISS.—The Rockett Machine & Foundry Co. has been organized by N. W. Rockett, of the Enterprise Machine & Foundry Co., P. I. Sweeney and R. W. Sharp, of Cuba.

CHATTANOOGA, TENN. — The Signal Knitting Co. has been incorporated with $150,000 capital by Floyd Murphy, G. H. Miller, W. A. Jones and others and will build a large knitting mill at Chattanooga.

MARION, KY.—An $18,000 bridge will be erected over the Trade water river by the county commissioners of Crittenden and Union counties.

OWENSBORO, KY.—The Kentucky Electrical Co. is asking for quotations on a small, four-spindle drill press to take not more than a ⅞-inch drill, a milling machine and a 24-inch lathe.

BALD KNOB, ARK.—J. L. Richardson and T. J. Campbell have been given a 50-year franchise for an electric light plant.

HARRISON, ARK.—Bids will be received until June 26, by W. F. Gordon, water commissioner, for a waterworks plant, including a power house, triplex power pump, oil engine or electric motor, cast iron pipe and resetting old machinery. W. O. Galbreath is the consulting engineer.

SOUR LAKE, TEX. — The Sour Lake, Light & Power Co. has been incorporated with $50,000 capital by F. H. Carpenter, A. H. Traver and T. F. Cruse.

OKLAHOMA CITY, OKLA.—Bonds for $1,500,000 have been voted for a new water supply system. Guy V. McClure is the city engineer.

New Trade Publications

GRINDERS.—The Lansing Stamping & Tool Co., Lansing, Mich., has issued a folder describing an internal grinder. A complete table of specifications as well as a general description of the tool are presented.

ENGINES.—The Chicago Pneumatic Tool Co., Chicago, has published a 34-page bulletin containing illustrations and charts of various types of gas and fuel oil engines. A sectional view of one of these machines is also presented.

PORTABLE TOOLS.—The Stow Mfg. Co., Binghamton, N. Y., has issued a 19-page booklet which illustrates the various uses of stow portable tools. Drills, grinders, buffers, sensitive boring machines and high speed small drills are shown.

TIE TAMPERS.—The Ingersoll-Rand Co., New York, has issued a bulletin describing pneumatic tie tampers, compressor cars and air compressors. There are a number of illustrations showing the practical applications of this company's products.

CONDUCTORS. — Flexible steel armored conductors are described and illustrated in a recent bulletin of the Sprague Electric Works of the General Electric Co., New York. The company's extensive line of steel conduits, stamped steel boxes, fittings and tools also is described and illustrated.

HANDLING SYSTEMS.—R. H. Beaumont Co., Philadelphia, builder of coke and coal handling systems for gas plants has issued a 43-page catalog which shows, by means of photographs and ground plans, the different installations which have been made of Beaumont equipment throughout the country.

WORM GEARS, WORMS AND SPIRALS. —The Boston Gear Works, Norfolk Downs, Quincy, Mass., has issued a pamphlet describing gears, worms and spirals. Several illustrations are given showing the manner in which reduction gears are operated together with a sketch showing how worm gears are designed.

HOISTS.—The Sprague Electric Works of the General Electric Co., New York, has issued a bulletin describing its line of 500-pound electric hoists. This hoist is especially adapted for service over lathes, planers, boring mills, drill presses, etc. Its construction is shown in detail and specifications are given.

BUCKET CONVEYORS.—The C. W. Hunt Co., West New Brighton, N. Y., has published a catalog describing its various types of bucket conveyors for handling coal and ashes in power plants. Many illustrations are included showing typical installations, together with several pages of mechanical and lay-out details of standard conveyors.

ANNEALING BOXES.—The United Engineering & Foundry Co., Pittsburgh, has issued a bulletin containing a brief historical sketch of the process of annealng and the reasons for using boxes. This bulletin also contains tables showing the life of this company's boxes, as well as the amount of material annealed in given periods.

BOLTS AND NUTS.—The Foster Bolt & Nut Co. Cleveland, has recently issued a 95-page catalog. The entire contents of this book is devoted to tables, specifications and technical data of various kinds. The catalog is unusually well arranged and probably represents as high a degree of excellence as is likely to be found in any trade publication.

HEADERS.—The line of open and solid die headers built by the Asa S. Cook Co., Hartford, Conn., is illustrated and described in a catalog now being distributed. These headers are designed for making rivets, studs, wood screw blanks, and similar products. The catalog also describes the company's line of pointers, threaders, shavers and slotting machines.

ENGINES.—The National Transit Pump & Machine Co., Oil City, Pa., is distributing attractive bulletins devoted to its lines of gas and oil engines. This company built the first 1,000 brake horsepower gas pumping engine constructed in this country, this unit being still in service. The National company's oil engines are built in units of 50 horsepower and larger.

HANDBOOK OF IRON AND STEEL.—The Interstate Iron & Steel Co., Chicago, has issued in pocket form a booklet containing all iron and steel classifications and lists of sizes rolled at the several mills of the company. Tables are also given of the weights of various sections and sizes. The publication is filled with information of value to users of bar iron and rerolled steel bars and sections.

ENGINE INDICATORS.—The Trill Indicator Co., Corry, Pa., has prepared a new catalog called the Indicator Book which contains a detailed description of the latest types of engine indicators and accessories with several pages of instructions and general hints on the use of the indicator, both on steam and internal combustion engines. The analysis of the indicator diagrams will be particularly helpful to users of this instrument.

FOUNDRY PRODUCTS.—James B. Clow & Sons, Chicago, have issued the third edition of their catalog entitled "Pipe Economy". This 104-page catalog contains extensive information regarding cast iron pipe, together with a section devoted to miscellaneous foundry products such as hydrants, bath tubs, valves, etc. The booklet is well illustrated and contains a brief sketch regarding the use of cast iron pipe, its manufacture and advantages.

COAL AND ASH GATES.—The C. W. Hunt Co., West New Brighton, N. Y., has prepared a catalog which describes the several types of cut-off valves it manufactures. Views and dimensions of the standard types are presented together with suggestions covering the uses to which each type is adapted. The C. W. Hunt Co. designs and constructs valves and slide gates for special requirements. This company has the exclusive agency for the MacDonald-Mann quenching chutes.

BOILER TUBES. — The Parkesburg Iron Co., Parkesburg, Pa., has published a 45-page booklet in which a brief history of the development of knobbled charcoal iron is given. The booklet is profusely illustrated and contains a number of technical tables of theoretical weights of iron tubes, average weights, etc. The specifications of the American Society of Mechanical Engineers are given as well as those of the American Master Mechanics' Association and the department of commerce.

AIR COMPRESSORS.—The Ingersoll-Rand Co., New York, has issued a number of bulletins describing various air types of compressors. Cross sections of each machine are shown, together with complete data with regard to capacity, speed, etc. A detailed description of each machine is given and the connecting rods, shafts, eccentrics and kindred parts of the machine are described. Considerable technical data are included in these bulletins covering the proper installations to meet various conditions.

STEEL BARRELS.—A 23-page catalog has been published by the barrel department of the Whitaker-Glessner Co., Portsmouth, O., in which considerable interesting data are given regarding the process of manufacturing steel containers of this type. The barrels are all built from open-hearth steel and the welding is done by means of the oxy-acetylene process. The specifications issued by the interstate commerce commission are reprinted in the pamphlet and Whitaker I. C. C. steel barrels are said to conform to these specifications.

TRUCKS.—The Locomobile Co. of America has issued a very attractive catalog containing full page illustrations of Locomobile trucks in various classes of service together with reproductions of letters from owners of Locomobile trucks. The universal use of the motor-driven apparatus in fire departments in some cities, the strenuous service which trucks are seeing on the battlefields of Europe make admirable material for catalogs such as that put out by the Locomobile Co. A partial list of Locomobile truck users is given on the last page of the booklet.

VALVES.—The Wm. Powell Co., Cincinnati, O., recently issued the second edition of its catalog No. 10. This booklet contains consderable data on the many types of valves made by this company, together with illustrations and price lists. In addition to tables of general technical information, instructions for the use and maintenance of the valves are also included with the description of each valve. The company also has published a condensed catalog, for the convenience of its customers, entitled Pocket Catalog A, which contains the essential information of catalog No. 10.

GASOLINE HOISTS. — The Lidgerwood Mfg. Co., Liberty street, New York, has recently issued a bulletin describing gasoline and oil engine hoists. The Lidgerwood company builds a complete line of contractors' supplies including standard steam, electric and gasoline hoists, derricks and fittings, special hoists, mine hoists, dredging engines, cableways, drag line excavators, ballest unloaders and log skidding machinery. Tables of specifications accompanying each illustration give considerable data regarding the machines. The oil engine hoists are designed in such a manner that additional drums may be added to the bed plates without difficulty.

GRAB BUCKETS.—A four-page bulletin issued by Edgar E. Brosius, Pittsburgh, is devoted to the various applications of the Brosius single hook grab bucket. In steel foundries this bucket may be utilized for shaking out sand at night, loading refuse into cars, cleaning up the molding floor, cutting and distributing the sand, filling molds, digging pits, etc. In gray iron foundries it can be used for similar purposes in addition to unloading coke, coal, sand, etc. At steel plants and rolling mills this type of bucket can be used to advantage for unloading and distributing gas producer and heating furnace coal, for handling coal in and out of stock, for removing roll scale from mill pits, for loading slag into cars, for excavating, loading dirt into cars and for unloading surfacing material from cars. Numerous service views showing this bucket in operation in various plants are included.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Lower price to Jan. 1, 1917; higher to July 1, 1917.)

Bessemer valley	$21.00 to 21.50
Bessemer, Pittsburgh	21.95 to 22.45
Basic, Pittsburgh	18.95 to 19.20
Basic, eastern Pa.	19.50 to 20.00
Basic, Buffalo	19.00 to 19.50
Malleable, Pittsburgh	19.45 to 19.95
Malleable foundry, Chicago	19.50
Malleable foundry, Philadelphia	21.50 to 21.75
Malleable foundry, Buffalo	18.50 to 19.00
No. 1X foundry, Philadelphia	20.75 to 21.25
No. 2 foundry, Pittsburgh	19.45 to 19.70
No. 2 foundry, Cleveland	19.30 to 19.80
No. 2 foundry, Ironton	18.00 to 19.00
No. 2 foundry, Chicago	19.00
No. 2X foundry, Philadelphia	20.00 to 20.50
No. 2X foundry, N. J. tidewater	20.25 to 20.75
No. 2X foundry, Buffalo	18.50 to 19.00
No. 2 plain, Philadelphia	19.50 to 20.00
No. 2 plain, N. J. tidewater	19.75 to 20.25
No. 2 plain, Buffalo	18.25 to 18.75
No. 2 southern, Birmingham	14.50 to 15.00
No. 2 southern, Cincinnati	17.40 to 17.90
No. 2 southern, Chicago	19.50 to 20.00
No. 2 southern, Phila. delivery	20.00 to 20.50
No. 2 southern, Cleveland	18.00 to 19.00
No. 2 southern, New York docks	19.00 to 19.50
No. 2 southern, Boston docks	19.25 to 19.75
No. 2 south. interior, New Eng.	20.00 to 21.00
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X, furnace	18.50 to 19.00
Virginia 2X, Philadelphia	21.25 to 21.75
Virginia, No. 2X, Jersey City	21.00 to 21.50
Virginia 2X, Boston points	21.75 to 22.25
Gray forge, eastern Pa.	19.00 to 19.50
Gray forge, Pittsburgh	18.95
Gray forge, Birmingham	13.50 to 14.00
Silveries, 8 per cent, furnace	26.00 to 29.00
Silveries, 8 per cent, Chicago	31.50
Low phos. Standard, Phila.	34.00 to 35.00
Low phos. Lebanon, Pa. furnace	30.00 to 32.00
Low. phos. Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	19.75 to 22.25
Charcoal, Buffalo	21.00 to 22.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	$4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bess., 51½ per cent, ton	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit.	8.5c to 8.9c
Local N. Y. and N. J. ores, unit.	8.5c to 8.75c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.
(Per unit Philadelphia.)
(Prices nominal.)

Foreign Bess., 50 to 65 per cent	8 to 8½
For'n non-Bess., 50 to 65 per cent	8 to 8½

COKE

(At the ovens.)

Connellsville furnace	$2.50 to 2.75
Connellsville fur., contract	2.75
Connellsville foundry, contract	3.50 to 3.75
Connellsville foundry	3.00 to 3.50
Wise county furnace, contract	3.00 to 3.25
Wise county foundry, contract	3.50 to 3.75
Pocahontas foundry, contract	3.25 to 3.75
Pocahontas furnace, contract	3.00 to 3.25
New River foundry, contract	3.75 to 4.25
New River furnace, contract	3.25 to 3.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, prompt	$225 to 275
Ferro manganese, 80 per cent, seaboard, contract	175
Spiegel, 20 per cent, fur. early and last half	55.00 to 60.00
Ferro-silicon, 50 per cent, Phil.	83.00 to 85.00
Ferro-silicon, 50 per cent, Pbgh.	83.00 to 85.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $32.00; 10 to 11 per cent, $33.00; 11 to 12 per cent, $34.00; 12 to 13 per cent, $35.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billet, Phila.	$50.00 to 55.00
Forging billets, Phila.	65.00 to 70.00
Forging billets, Pbgh., nominal.	65.00 to 70.00
Forging billets, Chicago	65.00
Wire rods, Pittsburgh (nom.)	60.00 to 65.00
Bessemer billets, Youngstown	42.00 to 45.00
Bessemer billets, Pittsburgh	42.00 to 45.00
Open hearth billets, Pittsburgh	42.00 to 45.00
Open hearth billets, Youngstown	42.00 to 45.00
Bess. sheet bars, Youngstown	42.00 to 45.00
Op. h'th sheet bars, Youngstown	42.00 to 45.00
Bess. sheet bars, Pittsburgh	42.00 to 45.00
Open hearth sheet bars, Pbgh.	42.00 to 45.00
Muck bar, Pittsburgh (nominal)	40.00 to 45.00

SKELP

Grooved steel skelp	2.50c
Sheard steel skelp	2.75c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh. & Chg. delivery after May 1, 1917	$33.00
Stan. op-h'th rails, Pbgh. & Chg. delivery after May 1, 1917	35.00
Light rails, 8 to 10 lbs., Pbgh.	50.00
Light rails, 8 lb., Chicago	43.00
Light rails, 12 to 14 lbs., Pbgh.	49.00
Light rails, 12 lbs., Chicago	42.00
Light rails, 16 to 20 lbs., Pbgh.	48.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. ad w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York, (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$41.00
Light rails, 25 to 45 lbs., Pbgh.	47.00
Light rails, 25 to 45 lbs., Chgo.	40.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails, light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c
Angle bars, st. sections, Chgo.	2.00c to 2.50c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	3.25c to 3.50c
Track bolts, Chicago	3.25c to 3.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, Pbgh.	2.50c to 2.75c
Structural shapes, Philadelphia	2.659c to 3.159c
Structural shapes, Chgo.	2.69c to 3.29c
Structural shapes, New York	2.669c to 3.169c
Tank plates, Chgo.	3.09c to 3.49c
Tank plates, Pittsburgh (con.)	2.75c to 2.90c
Tank plates, Pittsburgh	3.00c to 4.25c
Tank plates, Philadelphia	2.909c to 3.909c
Tank plates, New York	2.919c to 3.919c
Bars, soft steel, Chicago	2.69c to 3.29c
Bars, soft steel, Pbgh.	2.50c to 2.75c
Bars, soft steel, New York	2.669c to 3.169c
Bars, soft steel, Philadelphia	2.659c to 3.159c
Hoops, carloads, Pittsburgh	2.75c to 3.00c
Bands, Pittsburgh	2.50c to 2.75c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chgo.	2.35c to 2.50c
Bar iron, Philadelphia	2.559c
Bar iron, Cleveland	2.40c
Bar iron, New York	2.569c
Bar iron, Pittsburgh	2.65c to 2.75c
Hard steel bars, Chgo.	2.50c to 2.75c

SHEETS AND TIN PLATE

BLUE ANNEALED SHEETS PITTSBURGH

	Per lb.
Nos. 3 to 8	2.95c to 3.20c
Nos. 9 to 10	3.10c to 3.35c
Nos. 11 and 12	3.15c to 3.40c
Nos. 13 and 14	3.20c to 3.45c
Nos. 15 and 16	3.30c to 3.55c

BOX ANNEALED SHEETS, COLD ROLLED PITTSBURGH

Nos. 17 to 21	2.70c to 2.85c
Nos. 22 and 24	2.75c to 2.90c
Nos. 25 and 26	2.80c to 2.95c
No. 27	2.85c to 3.00c
No. 28	2.90c to 3.05c
No. 29	2.95c to 3.10c
No. 30	3.10c to 3.25c

GALVANIZED SHEETS OF BLACK SHEET GAGE, PITTSBURGH

Nos. 10 and 11	3.85c to 4.10c
No. 12	3.95c to 4.20c
Nos. 13 and 14	3.95c to 4.20c
Nos. 15 and 16	4.05c to 4.30c
Nos. 17 to 21	4.20c to 4.45c
Nos. 22 and 24	4.40c to 4.65c
Nos. 25 and 26	4.55c to 4.80c
No. 27	4.70c to 4.95c
No. 28	4.85c to 5.10c
No. 29	5.00c to 5.25c

No. 28, black, Chicago	3.09c to 3.19c
No. 28, galvanized, Chicago	5.19c
No. 10, blue annealed, Phila.	3.659c to 4.159c
No. 10, blue annealed, Chgo.	3.24c to 3.44c
Tin plate, 100 lb., coke base	$5.50

IRON AND STEEL PIPE

(Prices Adopted April 21, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	63	30
½ in.	67	40
¾ to 3 in.	70	50
Lap weld:—		
2 in.	65	40
2½ to 6 in.	68	48
7 to 12 in.	65	44½
13 and 14 in.	53½	..
15 in.	51	..

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	52	19
⅜ in.	53	20
½ in.	57	33
¾ to 1½ in.	60	38
Lap weld:—		
1¼ in.	48	26
1½ in.	54	33
2 in.	55	34
2½ to 4 in.	57	37
4½ to 6 in.	57	37
7 to 12 in.	56	36

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	56
Iron, 3½ to 4½ inches, l. c. l.	44

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.50 to 2.70
Plain wire, jobbers', Pittsburgh	2.45
Galvanized wire, jobbers', Pbgh.	3.15
Polished staples, Pbgh.	2.65
Galvanized staples, Pbgh.	3.35
Barb wire, painted, jobbers', Pbgh.	2.65
Barb wire, galv., jobbers', Pbgh.	3.35

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 50 and 10, cut threads, 50, larger or longer, 40.

Machine bolts with hot pressed nuts, ⅜ x 4 inches, smaller or short, rolled 50, 10 and 5; cut, 50 and 5; larger or longer, 40 and 10.

Cold pressed, semi-finished hexagon nuts, 60 and 10.

Gimlet and cone point lag bolts, 50 and 10. Hot pressed square, blank or tapped nuts, $2.90 off list; hot pressed hexagon blank or tapped, $2.90.

Cold pressed square, blank or tapped, $2.60 off; hexagon, blank or tapped, all sizes, $3.00.

RIVETS

Structural rivets, Pbgh	4.25c
Structural rivets, Chgo. delivery	3.50c
Boiler rivets, Pbgh	4.35c
Boiler rivets, Chgo. delivery	3.60c

STEEL SHEET PILING

(Pittsburgh)

Base sizes	2.50c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	5.00c to 5.50c

COLD ROLLED STRIP STEEL

Base price 6.00c to 6.50c per 100 pounds, hard, coils 1½ inches and wider and by .100 inches and heavier.

Extra for Thickness.

0.100-inch and thicker	Base
0.050 to 0.099	$0.05
0.036 to 0.049	0.20
0.035	0.20
0.031 to 0.034	0.35
0.026 to 0.030	0.45
0.020 to 0.024	0.55
0.025	0.45
0.017 to 0.019	1.35
0.015 to 0.016	1.75
0.013 to 0.014	2.45
0.012	2.80
0.011	3.15
0.010	3.50

Other extras as per card of March 15, 1916.

CAST IRON WATER PIPE

Four-inch, Chicago	$33.50 to 34.00
Six-inch and larger, Chicago	30.50 to 31.00
Six-inch Class B, New York	29.50
Four-inch Class B New York	32.50
Four to six-inch Birmingham	28.00
Six-inch and larger Birmingham	25.00

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.10c
Steel squares, 2-in. & ov., Cleve.	3.75c
Steel rounds, 2-in. & ov., Cleve.	3.75c
Steel bars, under 2 in., Cleveland	3.25c
Steel bars, Detroit	3.25c
Steel bars, Philadelphia	3.25c to 4.10c
Steel bars, New York	3.25c to 3.50c
Steel bars, St. Louis	3.15c
Steel bars, Cincinnati	3.20c to 3.75c
Steel bars, St. Paul	3.20c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.35c
Iron bars, Chicago	3.10c
Iron bars, Cleveland	3.20c
Iron bars, Detroit	3.25c
Iron bars, St. Louis	2.75c
Iron bars, Cincinnati	3.20c to 3.75c
Iron bars, Philadelphia	3.00c to 3.25c
Iron bars, New York	3.25c
Shapes, Chgo.	3.10c
Shapes, Detroit	3.25c
Shapes, St. Louis	3.15c
Shapes, St. Paul	3.20c
Shapes, New York	3.25c to 3.50c
Shapes, Cleveland	3.25c
Shapes, Philadelphia	3.25c to 3.50c
Shapes, Buffalo	3.35c
Shapes and plates, Cincinnati	3.20c to 3.50c
Plates, Chgo.	3.50c
Plates, Detroit	3.60c to 4.00c
Plates, St. Louis	3.55c
Plates, St. Paul	3.60c
Plates, New York	4.25c to 4.50c
Plates, Cleveland	3.65c
Plates, Philadelphia	4.00c to 4.25c
No. 10 blue anl. sheets, Chgo.	3.40c
No. 10 blue anl. sheets, Cleve.	3.50c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.45c
No. 10 blue anl. sheets, Cinci.	3.50c
No. 10 blue anl. sheets, St. Paul	3.50c
No. 10 blue anl. sheets, Detroit	3.55c
No. 28 black sheets, Chgo.	3.20c
No. 28 black sheets, Cleveland	3.20c to 3.25c
No. 28 black sheets, Cinci.	3.40c
No. 28 black sheets, Detroit	3.50c
No. 28 black sheets, St. Louis	3.20c
No. 28 black sheets, St. Paul	3.35c
No. 28 galv. sheets, Chgo.	5.25c to 5.50c
No. 28 galv. sheets, Cleveland	5.25c
No. 28 galv. sheets, Cincinnati	5.25c
No. 28 galv. sheets, Detroit	5.25c
No. 28 galv. sheets, St. Louis	5.25c to 5.50c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$18.50 to 19.00
Angle bars, steel, St. Louis	13.25 to 13.75
Arch bars and transoms, Chgo.	19.50 to 20.00
Arch bars and transoms, St. L.	19.00 to 20.00
Boiler plate, cut, No. 1, Chgo.	11.25 to 11.75
Boiler plate, cut, No. 1, St. L.	8.50 to 9.00
Boiler punchings, Chicago	14.00 to 14.50
Bundled sheet, Cincinnati	8.25 to 8.75
Busheling, No. 1, Chicago	12.25 to 12.75
Busheling, No. 1, Cincinnati	10.25 to 10.75
Busheling, No. 1, Cleveland	13.00 to 13.25
Busheling, No. 1, St. Louis	12.00 to 12.50
Busheling, No. 2, Chicago	8.75 to 9.25
Cast borings, Chicago	6.25 to 6.75
Cast borings, Cincinnati	7.00 to 7.50
Cast borings, Cleveland	6.00 to 6.25
Cast borings, St. Louis	6.00 to 6.50
Cast, No. 1, Chicago	12.00 to 12.50
Cast, No. 1, Cincinnati	11.25 to 11.75
Cast, No. 1, Cleveland	13.50 to 14.00
Cast, No. 1, St. Louis	12.75 to 13.25

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	13.75 to 14.25
Iron axles, St. Louis	23.50 to 24.00
Knuckles, coup., Chicago	15.50 to 16.00
Knuckles, coup., St. Louis	14.00 to 14.50
Locomotive tires, Chicago	20.00 to 20.50
Locomotive tires, St. Louis	19.50 to 20.00
Machine shop turnings, Chgo.	5.75 to 6.25
Machine shop turnings, Cleve.	6.25 to 6.50
Machine shop turnings, Cinci.	6.25 to 6.75
Machine shop turnings, St. L.	6.50 to 7.00
Malleable agricultural, Chgo.	12.00 to 12.50
Malleable agricultural, St. Louis	11.25 to 11.50
Malleable, Cincinnati	8.25 to 8.75
Malleable railroad, Chicago	12.50 to 13.00
Malleable railroad, St. Louis	12.00 to 12.25
Pipes and flues, Cleveland	11.50 to 11.75
Pipes and flues, Chicago	11.25 to 11.75
Pipes and flues, St. Louis	11.00 to 11.50
Railroad wrought, No. 1, Chgo.	15.25 to 15.75
Railroad wrought, No. 1, Cleve.	16.00 to 16.25
Railroad wrought, No. 1, St. L.	15.25 to 15.75
Railroad wrought, No. 1, Cinci.	13.00 to 13.50
Railroad wrought, No. 2, Chgo.	14.00 to 14.50
Railroad wrought, No. 2, St. L.	14.50 to 15.00
Shafting, St. Louis	$16.75 to 17.25
Springs, St. Louis	15.00 to 15.50
Springs, Chicago	16.50 to 17.00
Steel car axles, St. Louis	25.00 to 25.50
Steel car axles, Chicago	25.50 to 26.00
Stove plate, Chicago	11.25 to 11.75
Stove plate, Cleveland	10.00
Stove plate, Buffalo	11.50 to 12.00
Stove plate, Cincinnati	8.50 to 9.00
Stove plate, St. Louis	9.00 to 9.50

(Gross tons.)

Busheling, No. 1, Buffalo	$15.00 to 15.50
Busheling, No. 1, Pittsburgh	14.00 to 14.50
Busheling, No. 2, Buffalo	11.50
Bundled sheets, Pittsburgh	13.25 to 13.50
Bundled sheets, Cleveland	12.75 to 13.00
Bundled sheets, Buffalo	12.50 to 13.00
Car wheels (iron), Pittsburgh	14.50 to 15.00
Car wheels (steel), Pittsburgh	18.25 to 18.50
Car wheels, Chicago	12.50 to 13.00
Car wheels, eastern Pa.	16.50 to 17.00
Car wheels, Buffalo	14.00 to 14.50
Car wheels, N. Y.	14.25 to 14.75
Car wheels, St. Louis	12.00 to 12.50
Car wheels, Birmingham	10.50 to 11.00
Tram car wheels, B'ham	10.50 to 11.00
Cast borings, New York	8.00 to 8.50
Cast borings, eastern Pa.	10.25 to 10.75
Cast borings, Buffalo	9.25 to 9.75
Cast borings, Pittsburgh	9.25 to 9.75
Cast, No. 1, eastern Pa.	16.50 to 17.00
Cast, No. 1, Pittsburgh	16.00 to 16.50
Cast, No. 1, Birmingham	11.00 to 11.50
Cast, heavy No. 1, N. J. points	16.50 to 17.00
Forge, No. 1, eastern Pa.	14.00 to 14.50
Frogs, switches, guards, St. L.	15.00 to 15.50
Grate bars, Buffalo	12.00 to 12.50
Grate bars, N. J. points	13.50 to 13.75
Heavy axle turnings, Buffalo	12.00
Heavy melting steel, Pbgh	16.00 to 16.50
Heavy melting steel, Buffalo	17.00
Heavy melting steel, Chicago	15.00 to 15.50
Heavy melting steel, Cleveland	15.50 to 15.75
Heavy melting steel, Cincinnati	13.50 to 14.00
Heavy melting steel, eastern Pa.	15.50 to 16.00
Heavy melting steel, New York	14.00 to 14.50
Heavy melting steel, St. L.	15.25 to 15.75
Heavy melting steel, B'ham	9.50 to 10.00
Iron rails, Chgo.	18.50 to 19.00
Iron rails, Buffalo	18.00 to 18.50
Iron rails, Cincinnati	13.75 to 14.25
Iron rails, St. Louis	17.00 to 17.50
Iron rails, Cleveland	18.00 to 19.00
Iron axles, Pittsburgh	26.50 to 27.00
Iron axles, Cincinnati	20.25 to 20.75
Iron axles, eastern Pa.	27.00 to 28.00
Iron axles, Chicago	25.75 to 26.75
Iron axles, Buffalo	24.00 to 24.50
Low phos. steel, Buffalo	20.00 to 20.50
Low phos. steel, Pbgh	19.50 to 20.50
Low phos. steel, eastern Pa.	23.00 to 23.50
Machine shop turnings, Buffalo	8.00
Mch. shop turnings, New York	7.25 to 7.50
Mch. shop turnings, Pbgh	10.25
Mch. shop turnings, eastern Pa.	8.50 to 9.00
Malleable railroad, Cleveland	15.50 to 15.75
Malleable railroad, Buffalo	15.50 to 16.00
Malleable railroad, Pittsburgh	14.00 to 14.50
Malleable railroad, eastern Pa.	14.00 to 14.50
R. R. and mch. cast, No. 1 Bfl.	16.00 to 16.50
R. R. wrought, No. 1, Buffalo	19.00 to 19.50
R. R. wrgt., No. 1, eastern Pa.	21.50 to 22.00
R. R. wrgt., No. 1, New York	19.00 to 19.50
R. R. wrought, No. 1, Pbgh.	18.00
R. R. wrought No. 1, B'ham	13.00 to 13.50
Reroll. rails, 5 ft. & ov., Pbgh.	17.50
Reroll. rails, 5 ft. & ov., Chgo.	16.00 to 16.50
Reroll. rails, 5 ft. & ov., Cleve.	15.50 to 15.75
Reroll. rails, 5 ft. & ov., E. Pa.	18.00 to 18.50
Reroll. rails, 5 ft. & ov., St. L.	16.75 to 17.25
Reroll. rails, 5 ft. & ov., B'ham	14.00 to 14.50
Shafting, New York	19.00 to 20.00
Shafting, eastern Pa.	20.00 to 21.00
Shoveling steel, Chicago	14.00 to 14.50
Shoveling steel, St. Louis	13.00 to 13.50
Steel rails, short, Chicago	16.50 to 17.00
Steel rails, short, Cleveland	18.50 to 19.00
Steel rails, old, B'ham	11.00 to 11.25
Steel rails, short, St. Louis	15.25 to 15.75
Steel car axles, Birmingham	21.00 to 22.00
Steel car axles, New York	22.00 to 23.00
Steel car axles, Buffalo	24.00 to 24.50
Steel car axles, Cleveland	28.00
Steel car axles, Pittsburgh	26.50 to 27.00
Steel car axles, eastern Pa.	25.00 to 26.00
Stove plate, N. J. points	12.75 to 13.00
Stove plate, Birmingham	10.00 to 10.50
Stove plate, Pittsburgh	11.50 to 11.75
Stove plate, eastern Pa.	12.50 to 13.00
Wrought pipe, New York	11.00 to 11.50
Wrought pipe, eastern Pa.	12.75 to 13.25
Wrought pipe, Buffalo	14.00 to 14.50

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶ Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ACETYLENE IN CYLINDERS.
Linde Air Products Co., New York City.
Prest-O-Lite Co., The, Indianapolis, Ind.

ACCUMULATORS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Tod, Wm., Youngstown, O.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Watson-Stillman Co., New York City.
Wood, R. D., & Co., Philadelphia, Pa.

ACCUMULATORS. (Hydraulic.)
Southwark Fdy & Mch. Co., Philadelphia, Pa.

AEROPLANE WIRE, STRAND AND CORD.
Roebling's, John A., Sons Co., Trenton, N. J.

ALLOYS.
American Vanadium Co., Pittsburgh, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Blackwell, Geo. G., Sons & Co., Ltd., Liverpool, Eng
Bourne-Fuller Co., The, Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Edgertyn & Company, Inc., New York City.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United Steel Co., Canton, O.

ALUMINUM ALLOYS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM. (Granulated.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM. (Solder.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM. (Vanadium.)
American Vanadium Co., Pittsburgh, Pa.

ALUMINUM INGOTS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS. (Sheet.)
United Smelt'g & Alum. Co., New Haven, Ct.

ANGLES, TEES, CHANNELS.
(See Steel, Structural.)

ANNEALING BOXES AND POTS.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
Swedish Crucible Steel Co., Detroit, Mich.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

ARMATURES.
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

ASH BUCKETS.
Lakewood Engrg. Co., Cleveland, O.

AXLES.
American Bridge Co., New York City.
Bethlehem Steel Co., So. Bethlehem, Pa.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.

BABBITT METAL.
Lubricating Metal Co., The, New York City.

BAKERS, WIRE COATING.
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALLS. (Steel.)
Bethlehem Steel Co., The, So. Bethlehem, Pa.
New Departure Mfg. Co., Bristol, Conn.

BANDS. (Steel.)
Carnegie Steel Co., Pittsburgh, Pa.

BARGES. (Steel.)
American Bridge Co., New York City.

BARRELS, TUMBLING. (Wire Nails.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARS—ALLOY.
Central Steel Co., The, Massillon, O.

BARS. (Concrete Reinforcing.)
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.

BARS. (Iron and Steel.)
American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago, Ill
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Steel Co., Canton, O.
Upson Nut Co., Cleveland, O.

BEAMS, CHANNELS AND ANGLES.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS. (Ball.)
New Departure Mfg. Co., Bristol, Conn.

BEARINGS. (Vanadium Steel.)
American Vanadium Co., The, Pittsburgh, Pa.

BELLS. (Marine and Locomotive.)
Vanduzen, E. W., Co., The, Cincinnati, O.

BELT CEMENT AND DRESSING.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.
Williams, I. B., & Sons, Dover, N. H.

BELT LACING. (Leather.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BELTING. (Chain.)
Link-Belt Co., Chicago, Ill.

BELTING—LEATHER.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BENCHES. (Steel.)
New Britain Mach. Co., New Britain, Conn.

BENCHES AND FRAMES. (Drawing.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., The, Cuyahoga Falls, O.

BENDING AND STRAIGHTENING MACHINES.
Abramsen Engrg. Co., Pittsburgh, Pa.
Bertsch & Co., Cambridge City, Ind.
Birdsboro St'l Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Covington Machine Co., Covington, Va.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hinman, D. A., & Co., Sandwich, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York, N. Y.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Watson-Stillman Co., New York, N. Y.

BENZOL RECOVERY PLANTS.
Hansen, Pavitt & Jensen, New York City.
Koppers, H., Co., Pittsburgh, Pa.

BILLETS.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Whitaker-Glessner Co., Portsmouth Works, Portsmouth, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown.

BLAST FURNACE SKIP CARS.
Lakewood Engrg. Co., Cleveland, O.

BLAST FURNACE VOLUME METERS.
Clark, Chas. J., Chicago, Ill.

BLOCKS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.

BLOOMS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Hillman, J. H., & Sons, Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sh't & Tube Co., Youngstown, O.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above